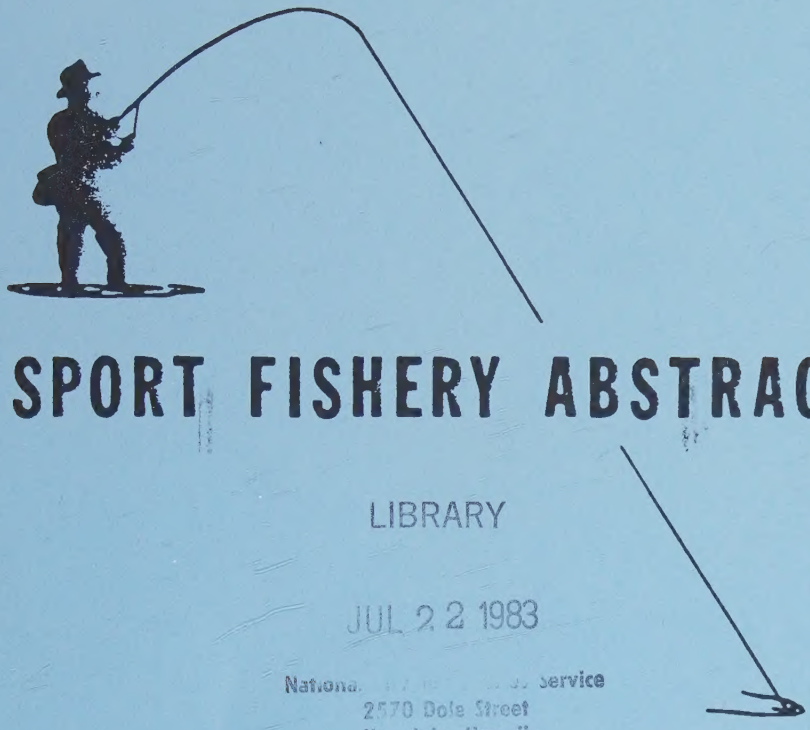
28(2)

28(2)



SPORT FISHERY ABSTRACTS

LIBRARY

JUL 22 1983

National ... Service
2570 Dole Street
Honolulu, Hawaii

Vol. 28, No. 2, 1983

DEPARTMENT OF THE INTERIOR
U. S. FISH AND WILDLIFE SERVICE

UNITED STATES DEPARTMENT OF THE INTERIOR

SPORT FISHERY ABSTRACTS

Roger Schoumacher, Editor
Terry N. Sexson, Assistant Editor

Editorial Office
U.S. Fish and Wildlife Service
Aylesworth Hall, CSU
Fort Collins, Colorado 80523

Sport Fishery Abstracts is intended to furnish fishery biologists with abstracts of current literature in sport fishery research and management.

One volume, consisting of four numbers, is issued each year. Each number contains separate Author, Geographic, and Taxonomic indexes, and the final number of each volume contains cumulative Author, Geographic, Taxonomic, and Subject indexes, and a list of publications screened. Authors who publish in journals not screened for *Sport Fishery Abstracts*, and who would like their publications included, should submit abstracts to the Editor.

The U.S. Fish and Wildlife Service assumes no responsibility for the accuracy of material from outside sources, and can only supply copies of articles written and published by the U.S. Fish and Wildlife Service.

SPORT FISHERY ABSTRACTS

An abstracting service for fishery research and management

Volume 28(2) 1983

CONTENTS

AQUATIC PLANTS AND THEIR CONTROL..... 1

CULTURE AND PROPAGATION

General Fish Culture..... 1
Trout and Salmon Culture..... 1
Other Anadromous Species Culture..... 3
Warmwater Culture..... 3
Mariculture..... 5
Feeds, Feeding and Nutrition..... 6
Aquariums..... 10
Miscellaneous Culture Techniques and Equipment..... 10

LIMNOLOGY AND OCEANOGRAPHY

Physical..... 11
Chemical..... 11
Plankton..... 11
Primary Production..... 12

MORPHOLOGY, PHYSIOLOGY, GENETICS AND BEHAVIOR

Morphology..... 12
Physiology..... 17
Genetics, Variation Studies, Hybridization..... 37
Behavior..... 40

NATURAL HISTORY

Life Histories - General Works..... 45
Population Studies - Production, Standing Crop, Recruitment. 50
Spawning Habits and Movements, Sex Ratios, Fecundity, etc... 54
Movements, Seasonal and Depth Distribution, etc..... 60
Foods and Feeding..... 62
Age and Growth..... 74
Geographical Distribution, Fish surveys, etc..... 79
Abundance, Factors of; Survival and Mortality..... 82
Identification, Keys, Classification..... 83

PARASITES AND DISEASES

General..... 87
Bacterial..... 88
Fungal..... 92
Protozoan..... 92
Viral..... 94
Other..... 94

POLLUTION AND TOXICOLOGY

Pollution..... 98
Toxicology; Bioassays..... 102

RESEARCH AND MANAGEMENT

General..... 109
Administration and Planning..... 110
Reports of Fishery Stations, States, etc..... 110
Habitat Alteration..... 110
Harvest, Creel Census, etc..... 111
Regulations..... 112
Marking and Tagging..... 112
Stocking and Introductions..... 113
Fishing Gear and Techniques..... 113
Fertilization of Water and Soil..... 114
Fishways, Fish Passage through Dams, etc..... 115
Mathematical, Statistical Methods and Modeling..... 115
Lake Management and Research..... 115
River and Stream Management and Research..... 116
Large Impoundment Management and Research..... 117
Estuary Management and Research..... 117
Marine Management and Research..... 118
Miscellaneous Techniques and Equipment..... 118
Reviews, Bibliographies, etc..... 119
Water Use and Conservation..... 119

AUTHOR INDEX (Salmon)..... 121
GEOGRAPHICAL INDEX (Yellow)..... 145
SYSTEMATIC INDEX (Blue)..... 149

AVAILABILITY OF REPRINTS AND PUBLICATIONS

SPORT FISHERY ABSTRACTS does not distribute any of the papers abstracted herein, nor can the editor of SPORT FISHERY ABSTRACTS undertake to obtain copies of these papers for anyone. A reprint of an article published in a journal may be available from the author, from the organization with which the author is affiliated, or from the publisher of the journal in which the article appeared. When an author's address is know, it is shown in square brackets following the citation. Addresses of most wildlife organizations can be obtained from the CONSERVATION DIRECTORY, an annual publication available from the National Wildlife Federation, 1412 16th Street, N.W., Washington, D. C. 20036, at a price of $6.00 per copy plus $1.55 postage and handling. This directory lists more than 900 agencies and organizations concerned with natural resources use.

83-000557 Callahan, J. L. and J. A. Osborne. COMPARISON OF HYBRID GRASS CARP AND GRASS CARP. *Fla. Sci.* 46(Suppl. 1):19. 1983. Abstract only. SFA 28(2)

[Dep. Biol. Sci., Univ. Cent. Fla., P.O. Box 25000, Orlando 32816] Numerous methods have been used in an attempt to control the exotic *Hydrilla verticillata* with varying degrees of success. The grass carp (*Ctenopharyngodon idella*) has shown its ability to control or reduce the growth of hydrilla in various studies, however, the potential exists for the grass carp to escape into rivers, overpopulate, and denude the native vegetation. The hybrid grass carp, which is considered sterile, is being studied as a weed control agent, but morphological deformities and low feeding rates were prevalent in early spawns. These problems were assumed to be corrected in the 1981 spawn, which resulted in a functional triploid hybrid grass carp, though our comparison showed little difference in the hybrid grass carp produced in 1979, 1980, and 1981. In feeding studies, the 1981 hybrid grass carp was more efficient, consumed less vegetation than fish from the 1979 and 1980 spawns, and therefore is considered less useful as a weed control agent.

GENERAL FISH CULTURE

83-000558 Ajana, A. M. BRACKISH WATER FISH CULTURE IN NIGERIA: PRESENT STATUS AND PRACTICES. *Aquaculture* 31(2-4):329-337. Mar. 1983. SFA 28(2)

[Nigerian Inst. Oceanogr. Mar. Sci., P.M.B. 12729, Victoria Island, Lagos, Nigeria] Nigeria has been producing about 67% and importing 33% of its total fish supply. From 1978 to 1980 inclusive the total fish supply ranged from 720,775 to 878,000 tonnes, including 202,208 to 326,000 tonnes of imported fish. The 1980 estimated fish demand was 2,106,000 tonnes but the supply was only 878,000 tonnes (53%). To cope with present demands, it is estimated that domestic production will need to increase 300% and this can be effected by exploiting new fishing grounds and expanding aquaculture. Of the 64,900 ha available, only 82 ha is currently being properly fish farmed. Achievements, problems and plans are described.

83-000559 Chakroff, M. S. AQUACULTURE EXTENSION SERVICES REVIEW. *FAO Fish. Circ.* No. 747. iii + 25p. 1982. SFA 28(2)

[FAO of the UN, Rome, Italy]

83-000560 Ghittino, P., (ed.). TECNOLOGIA E PATOLOGIA IN ACQUACOLTURA. VOL. 1. TECNOLOGIYA *Tipagrafia Emilio Bono, Turin, Italy* vii + 532p. In Italian. SFA 28(2)

83-000561 Kinghorn, B. P. A REVIEW OF QUANTITATIVE GENETICS OF FISH BREEDING. *Aquaculture* 31(2-4):283-304. Mar. 1983. SFA 28(2)

[Agric. Res. Cent., Trangie, N.S.W. 2823, Australia] In recent years there has been increasing research activity in quantitative genetics of farmed fish, especially relating to the salmonid species. This review covers all aspects of quantitative genetics which are of direct or potential relevance to improving the efficiency of commercial production of farmed fish.

TROUT AND SALMON CULTURE

83-000562 Blanc, J. M. and H. Poisson. PARENTAL SOURCES OF VARIATION IN HATCHING AND EARLY SURVIVAL RATES OF *SALMO TRUTTA* ♀ X *SALVELINUS FONTINALIS* ♂ HYBRID. *Aquaculture* 32(1-2):115-122. Apr. 1983.

TROUT AND SALMON CULTURE (CONTINUED)

83-000562 CONTINUED SFA 28(2)
[INRA, BP3, Saint-Pé-sur-Nivelle, 64310 Ascain, France] The variability of parental origin in hatching and early survival rates of brown trout ♀ x brook trout ♂ hybrids was estimated, using factorial breeding plans, and monospecific control samples from each dam. Evidence was obtained of: sire effects bearing on eggs and alevins; low sire x dam interaction effects; important dam effects, some of which bear on eggs and are strongly correlated to those measured from lots, while the other, uncorrelated effects, are observed on alevin survival. From these results it is concluded that genetic investigations of parental differences, especially maternal ones, operating on progeny survival should lead to improvement of hybridization techniques.

83-000563 Choubert, G., Jr. and P. Luquet. UTILIZATION OF SHRIMP MEAL FOR RAINBOW TROUT (*SALMO GAIRDNERI* RICH.) PIGMENTATION. INFLUENCE OF FAT CONTENT OF THE DIET. *Aquaculture* 32(1-2):19-26. Apr. 1983. In English with French summ. SFA 28(2)
[INRA, B.P. 3, Saint-Pée-sur-Nivelle, 64310 Ascain, France]

83-000564 Kapuscinski, A. R. D. and J. E. Lannan. ON DENSITY OF CHUM SALMON (*ONCORHYNCHUS KETA*) EGGS IN SHALLOW MATRIX SUBSTRATE INCUBATORS. *Can. J. Fish. Aquatic Sci.* 40(2):185-191. Feb. 1983. SFA 28(2)
[Mar. Sci. Cent., Oreg. State Univ., Corvallis 97365]

83-000565 Poston, H. A. EFFECT OF POPULATION DENSITY OF LAKE TROUT IN CYLINDRICAL JARS ON GROWTH AND OXYGEN CONSUMPTION. *Prog. Fish-Cult.* 45(1):8-13. Jan. 1983. SFA 28(2)
[U.S. FWS, Tunison Lab. Fish Nutr., Cortland, NY 13045]

83-000566 Stoss, J. and W. Holtz. SUCCESSFUL STORAGE OF CHILLED RAINBOW TROUT (*SALMO GAIRDNERI*) SPERMATOZOA FOR UP TO 34 DAYS. *Aquaculture* 31(2-4):269-274. Mar. 1983. SFA 28(2)
[Inst. Tierzucht Haustiergenet., Univ. Göttingen, Albrecht-Thaer-Weg 1, 3400 Göttingen, West Germany] Undiluted rainbow trout semen, supplemented with penicillin and streptomycin to prevent bacterial growth, was kept at 0°C in an atmosphere of moisture-saturated oxygen. Under these conditions, it retained its full fertilizing capacity for 34 days. When storing semen in sealed polyvinylchloride bags filled with oxygen, satisfactory fertilizing capacity was retained for 20 days.

83-000567 Stoss, J. and W. Holtz. CRYOPRESERVATION OF RAINBOW TROUT (*SALMO GAIRDNERI*) SPERM. III. EFFECT OF PROTEINS IN THE DILUENT, SPERM FROM DIFFERENT MALES AND INTERVAL BETWEEN SPERM COLLECTION AND FREEZING. *Aquaculture* 31(2-4):275-282. Mar. 1983. SFA 28(2)
[Inst. Tierzucht Haustiergenet., Univ. Göttingen, Albrecht-Thaer-Weg 1, 3400 Göttingen, West Germany] Three experiments were conducted to further improve the technique of pellet-freezing of rainbow trout semen. When comparing different sources of protein in the diluent, a combination of the soybean protein Promine D and bovine serum albumin gave the best result (77.5% eyed eggs versus 91.5% for fresh semen controls). Considerable individual variation was observed when comparing post-thaw fertility of semen from different males. Mixing of semen from two or more males did not have a remarkable effect on fertilization rate. Pre-freezing rate of motility was found not to be a reliable estimate of post-thaw fertility. A distinct decrease in post-thaw fertility observed with increasing storage time prior to freezing leads to the recommendation that rainbow trout semen should be cryopreserved as soon as possible after collection.

TROUT AND SALMON CULTURE (CONTINUED)

83-000568 Zaugg, W. S.; D. D. Roley; E. F. Prentice; K. X. Gores and F. W. Waknitz. INCREASED SEAWATER SURVIVAL AND CONTRIBUTION TO THE FISHERY OF CHINOOK SALMON (*ONCORHYNCHUS TSHAWYTSCHA*) BY SUPPLEMENTAL DIETARY SALT. *Aquaculture* 32(1-2):183-188. Apr. 1983. SFA 28(2)

[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112] Addition of sodium chloride (NaCl) to the diet of juvenile fall chinook salmon for 6 weeks prior to release resulted in 65% greater adult recovery in the fishery and return to the hatchery than obtained with controls fed an unsupplemented diet. In a separate study, juvenile fall chinook salmon fed supplemental sodium chloride had significantly higher gill sodium and potassium (Na^+-K^+) ATPase activities and greater survival than controls when transfered directly to seawater net-pens.

OTHER ANADROMOUS SPECIES CULTURE

83-000569 Doroshov, S. I.; W. H. Clark, Jr.; P. B. Lutes; R. L. Swallow; K. E. Beer; A. B. McGuire and M. D. Cochran. ARTIFICIAL PROPAGATION OF THE WHITE STURGEON, *ACIPENSER TRANSMONTANUS* RICHARDSON. *Aquaculture* 32(1-2):93-104. Apr. 1983. SFA 28(2)

[Anim. Sci. Dep., Univ. Calif., Davis 95616] The first successful reproduction of white sturgeon in captivity was conducted from February to May 1980. Ovulation and spermiation were induced in wild-caught broodstock with injections of pituitary glands from sturgeon and common carp. Eggs were incubated and hatched in MacDonald jars. Larvae and fingerlings were reared in large numbers using a variety of intensive and extensive techniques. The procuedures and preliminary results of this work are described.

WARMWATER CULTURE

83-000570 Cohen, D.; Z. Ra'Anan and A. Barnes. PRODUCTION OF THE FRESHWATER PRAWN *MACROBRACHIUM ROSENBERGII* IN ISRAEL. I. INTEGRATION INTO FISH POLYCULTURE SYSTEMS. *Aquaculture* 31(1):67-76. Feb. 1983. SFA 28(2)

[Dep. Environ. Biol., Hebrew Univ. Jerusalem, Jerusalem, Israel]

83-000571 Divanach, P. and M. Kentouri. DONNEES PRELIMINAIRES SUR LA TECHNIQUE DE PRODUCTION, LA CROISSANCE ET LA SURVIE DES LARVES DE MARBRE *LITHOGNATHUS MORMYRUS*. [PRELIMINARY DATA ON PRODUCTION TECHNIQUES, GROWTH, AND SURVIVAL OF *LITHOGNATHUS MORMYRUS* LARVAE.] *Aquaculture* 31(2-4):245-256. Mar. 1983. In French with English summ. SFA 28(2)

[Stn. Biol. Mar. Lagunaire, 34200 Sète, France] Eggs of *Lithognathus mormyrus* stripped from dead breeding fish are incubated and give larvae which are then reared to the fry stage. The yield of eggs depends on the freshness of the breeding fish. Survival of larvae is made possible by a natural bloom of ciliates, the duration of which depends on low initial larval density. In spite of a length of only 1.7 mm at hatching, growth is comparable with that of the sea bass. Fry adaptation to pellets is easy. Possibilities of mass production of fry with extensive rearing techniques are discussed.

83-000572 Eyeson, K. N. STUNTING AND REPRODUCTION IN POND-REARED *SAROTHERODON MELANOTHERON*. *Aquaculture* 31(2-4):257-267. Mar. 1983. SFA 28(2)

[Dep. Zool., Univ. Cape Coast, Cape Coast, Ghana] Stunting has been demonstrated in a lagoon cichlid fish, *Sarotherodon melanotheron*, bred under pond conditions. The males mature earlier than the females and there

WARMWATER CULTURE (CONTINUED)

83-000572 CONTINUED are indications that breeding may occur in 6-month-old fish. The size at first maturity seems to vary in response to certain changes in the conditions of the pond. Reproductive activity was low due to low fecundity, discontinuous development of oocytes and the fact that only 30 to 40% of mature size female fish contained ripe ovaries. The results are compared with observations on natural populations.

83-000573 Fouche, L.; P. Webb; W. Killcreas; J. E. Waldrop; K. Chin; N. Kennedy and R. Paschal. A RECORDS SYSTEM FOR CATFISH PRODUCTION MANAGEMENT DECISION-MAKING FOR THESE MICROCOMPUTERS: RADIO SHACK MODEL III, RADIO SHACK MODEL II, RADIO SHACK MODEL 16, AND IBM PERSONAL COMPUTER. *Miss. Agric. For. Exp. Stn. Agric. Econ. Tech. Publ.* No. 43. iii + 106p. Feb. 1983. SFA 28(2)

[Dep. Agric. Econ., Miss. Agric. For. Exp. Stn., Miss. State Univ., Mississippi State 39762]

83-000574 Gaigher, I. G. and J. B. Krause. GROWTH RATES OF MOZAMBIQUE TILAPIA (*OREOCHROMIS MOSSAMBICUS*) AND SILVER CARP (*HYPOPHTHALMICHTHYS MOLITRIX*) WITHOUT ARTIFICIAL FEEDING IN FLOATING CAGES IN PLANKTON-RICH WASTE WATER. *Aquaculture* 31(2-4):361-367. Mar. 1983. SFA 28(2)

[Inst. Environ. Sci., Univ. Orange Free State, P.O. Box 339, Bloemfontein 9300, South Africa] *Hypophthalmichthys molitrix* and *Oreochromis mossambicus* were reared without artificial feeding in 0.57 m^3 wire cages suspended in human sewage and pig feedlot waste treatment systems. At a cage density of 17 m^{-3} *H. molitrix* grew from 15 to 260g in 190 days but then growth ceased due to unknown factors. *O. mosambicus* grew rapidly at various densities; the maximum being from 10 to 130g in 98 days. In both species the maximum individual daily mass increase of 2.5 (*H. molitrix*) and 1.4g (*O. mossambicus*) occurred during December to Janary. Mortalities were probably mainly due to handling. Tilapia grown in the human sewage treatment system were in a better condition than those from the pig feedlot waste treatment system.

83-000575 Hickel, R.; W. E. Killcreas and J. E. Waldrop. A CATFISH GROWTH SIMULATION MODEL: FOR USE WITH TRS-80 MODELS II, III, 16, AND IBMPC MICROCOMPUTERS. *Miss. State Univ. Agric. Econ. Tech. Publ.* No. 42. 11p. Jan. 1983. SFA 28(2)

[Dep. Agric. Econ., Miss. State Univ., Mississippi State 39762]

83-000576 Huner, J. V.; M. Miltner; J. W. Avault, Jr. and R. A. Bean. INTERACTIONS OF FRESHWATER PRAWNS, CHANNEL CATFISH FINGERLINGS, AND CRAYFISH IN EARTHEN PONDS. *Prog. Fish-Cult.* 45(1):36-40. Jan. 1983. SFA 28(2)

[Dep. Biol. Sci., Health Res. Cent., Southern Univ., Baton Rouge, LA 70813]

83-000577 Meade, J. W.; W. F. Krise and T. Ort. EFFECT OF TEMPERATURE ON PRODUCTION OF TIGER MUSKELLUNGE IN INTENSIVE CULTURE. *Aquaculture* 32(1-2):157-164. Apr. 1983. SFA 28(2)

[U.S. FWS, Natl. Fish. Res. Dev. Lab., R.D. 4, Box 47A, Wellsboro, PA 16901] Tiger muskellunge (*Esox masquinongy* x *E. lucius*) juveniles were reared at constant temperatures in the temperature range 14-28°C. For fish 3-4 cm long, growth, production and feed conversion efficiency were greatest at 20-22°C. Survival was reduced and unaccountable mortality (cannibalism index) was greatest at 24°C. Growth per unit of temperature was about equal over the range 16-22°C. For fish 12-13 cm long, feed conversion efficiency and mean individual growth was greatest at 23°C; growth per unit of temperature was nearly equal over the range 20-24°C.

MARICULTURE

83-000578 Alliot, E.; A. Pastoureaud and H. Thebault. INFLUENCE DE LA TEMPERATURE ET DE LA SALINITE SUR LA CROISSANCE ET LA COMPOSITION CORPORELLE D'ALEVINS DE *DICENTRARCHUS LABRAX*. [INFLUENCE OF TEMPERATURE AND SALINITY IN GROWTH AND BODY COMPOSITION OF SEABASS FINGERLINGS *DICENTRARCHUS LABRAX*.] *Aquaculture* 31(2-4):181-194. Mar. 1983. In French with English summ. SFA 28(2)

[Stn. Mar. d'Endoume, Rue de la Batterie des Lions, 13007 Marseille, France] Growth, food conversion, and body composition of sea bass fingerlings, *Dicentrarchus labrax*, exposed to different temperatures (15 and 22°C) and salinities (6, 11, 24 and 37°/oo) were studied. Temperature was found to have the more significant influence on these parameters. At the higher temperature, fingerlings grew faster in high and low salinities (6 and 37°/oo). At the lower temperature, growth was slightly faster at 11 and 24°/oo. Body composition was affected mainly by temperature; salinity had no significant effect. Trypsin-like activity in the digestive tract was very low at 5°/oo and 15°C. Sea bass fingerlings seem to be very tolerant to changes in temperature and salinity of their environment. The results are discussed in the context of fish culture.

83-000579 Hettler, W. F. TRANSPORTING ADULT AND LARVAL GULF MENHADEN AND TECHNIQUES FOR SPAWNING IN THE LABORATORY. *Prog. Fish-Cult.* 45(1):45-48. Jan. 1983. SFA 28(2)

[NMFS, Beaufort Lab., Beaufort, NC 28516]

83-000580 MacGregor, R. III; M. S. Greeley, Jr.; W. C. Trimble and W. M. Tatum. SEASONAL VARIATION OF REPRODUCTION AND FATTENING IN GULF KILLIFISH FROM BRACKISH MARICULTURE PONDS. *Northeast Gulf Sci.* 6(1):23-32. Feb. 1983. SFA 28(2)

[Dep. Biol., Univ. Ala., Birmingham 35294] Seasonal changes in gonadal indices, plasma androgens in males, plasma estrogens and egg production in females, and body fat content in both sexes were monitored in gulf killifish, *Fundulus grandis*, reared in mariculture ponds. Changes in plasma androgens (males) and estrogens (females) were positively correlated with changes in gonadosomatic indices (GSI) of both sexes during most of the year. Seasonal variation in the GSIs of a nearby natural marsh population were similar, though not identical, to that of the pond-raised population. However several distinct differences were noted between these two populations: 1) spawning was prolonged in the mariculture population as compared with the wild population; 2) body fat content of the mariculture fish was significantly greater than wild fish during all seasons of the year; 3) a significant negative correlation between the seasonal cycles of body fattening and reproduction was observed in the mariculture fish but not in the wild fish. These data indicate that the mariculture environment and resultant high levels of body fattening supported prolonged spawning in this species.

83-000581 Wu, R. S. S. and N. Y. S. Woo. TOLERANCE OF HYPO-OSMOTIC SALINITIES IN THIRTEEN SPECIES OF ADULT MARINE FISH: IMPLICATIONS FOR ESTUARINE FISH CULTURE. *Aquaculture* 32(1-2):175-181. Apr. 1983. SFA 28(2)

[Fish. Res. Stn., Aberdeen, Hong Kong] Thirteen species of adult marine fish were exposed to hypo-osmotic salinities for more than 2 weeks. Twelve species survived at 10°/oo, six species at 5°/oo and three species at 3°/oo. No abnormal behavior was observed, but the water content of muscle increased in all species. Shallow-water, inshore species generally appeared to be more tolerant to changes in salinity than deep-water, offshore species. Tolerance of hypo-osmotic salinities varied within a single family or genus. For most species tested, the critical tolerance limit is about 5 to 10°/oo, and above 10°/oo all species survived without apparent abnormal behavior. The present results suggest that many marine fish are more euryhaline than expected, and could be selected for farming in estuaries, provided that production is not reduced in fluctuating salinities.

FEEDS, FEEDING, AND NUTRITION

83-000582 Bromley, P. J. and B. R. Howell. FACTORS INFLUENCING THE SURVIVAL AND GROWTH OF TURBOT LARVAE, *SCOPHTHALMUS MAXIMUS* L., DURING THE CHANGE FROM LIVE TO COMPOUND FEEDS. *Aquaculture* 31(1):31-40. Feb. 1983. SFA 28(2)

[Fish. Lab., Pakefield Rd., Lowestoft, Suffolk NR33 0HT, England] In a series of 14 trials the survival of turbot larvae during transfer from a live to an inert food ranged from 45% to 95%. The time taken for up to 50% of each batch to establish feeding was also highly variable, ranging from 1 to 11 days. The potential to accept inert food was probably established during the initial stages of weaning or even earlier. Final survival could reliably be predicted from survival and feeding response during the first few days of weaning. Evidence was presented which suggests that the quality of live food (*Artemia salina* L.) influenced the subsequent acceptance of an inert diet. For example, larvae reared on San Francisco Bay nauplii accepted an artificial diet less readily than those reared on *Artemia* which had first been fed on the unicellular alga *Isochrysis* for 2 days. Dietary water content was not an important factor governing weaning success.

83-000583 Degani, G.; C. Dosoretz; D. Levanon; U. Marchaim and Z. Perach. FEEDING *SAROTHERODON AUREUS* WITH FERMENTED COW MANURE. *Bamidgeh* 34(4):119-129. Dec. 1982. SFA 28(2)

[Galilee Technol. Cent., Kiriat Shmona, Israel] The following research examined the replacement of part of the feed of *Sarotherodon aureus* by the slurry, after thermophilic anaerobic digestion of cow manure, in two different forms: as a liquid (12% solid matter) that is the end result of the process, and in a dry state, after sun-drying of the liquid slurry in three layers, one above the other. The results show that the group that was fed with high-protein pellets and the group that was fed 50% digested slurry and 50% low-protein feed, grew at the same rate, while the group that was fed 50% sun-dried slurry and 50% low-protein feed, had a significantly slower growth rate compared with the other two groups. The replacement of 50% of the feed by digested slurry caused a rise in the quantity of chlorophyll a (which served in this research as a measure of the quantity of algae) and in primary production, from which the tilapia seem to have benefitted sufficiently to make up for the food deficit. The dired slurry did not cause a rise in chlorophyll a, and the primary production was lower.

83-000584 Hardy, R. W. and C. V. Sullivan. CANOLA MEAL IN RAINBOW TROUT (*SALMO GAIRDNERI*) PRODUCTION DIETS. *Can. J. Fish. Aquatic Sci.* 40(3):281-286. Mar. 1983. In English with French summ. SFA 28(2)

[Sch. Fish., WH-10, Univ. Wash., Seattle 98195]

83-000585 Millikin, M. R. INTERACTIVE EFFECTS OF DIETARY PROTEIN AND LIPID ON GROWTH AND PROTEIN UTILIZATION OF AGE-0 STRIPED BASS. *Trans. Am. Fish. Soc.* 122(2A):185-193. Mar. 1983. SFA 28(2)

[NMFS, P.O. Box 12607, Charleston, SC 29412]

83-000586 Morita, K.; M. Furuichi and Y. Yone. EFFECT OF CARBOXYMETHYLCELLULOSE SUPPLEMENTED TO DEXTRIN-CONTAINING DIETS ON THE GROWTH AND FEED EFFICIENCY OF RED SEA BREAM. *Bull. Jpn. Soc. Sci. Fish.* 48(11):1617-1620. Nov. 1982. SFA 28(2)

[Fish. Res. Lab., Kyushu Univ., Tsuyazaki, Fukuoka 811-33, Japan] In order to investigate the nutritive effect of carboxymethylcellulose (CMC), groups of red sea bream *Chrysophrys major* were fed on the 10%, 20%, or 30% dextrin-containing control diets without CMC and on the diets which were supplemented with CMC at a level of 3%, 6%, 9%, or 12% to each control diet. The supplement of CMC improved the growth and feed efficiency, and the optimum level of CMC in diets increased with the increase of dietary dextrin.

FEEDS, FEEDING, AND NUTRITION (CONTINUED)

83-000587 Schade, R. UNTERSUCHUNGEN ZUR NAHRUNGSAUSNUTZUNG IM DARM VON KARPFEN (*CYPRINUS CARPIO* L.). [INVESTIGATIONS ON FOOD UTILIZATION IN THE GUT OF CARP (*CYPRINUS CARPIO* L.).] *Arch. Hydrobiol. Supplementb.* 59(4):377-415. 1982. In German with English summ. SFA 28(2)

[Limnol. Inst., Mainaustr. 212, 7750 Konstanz, West Germany] Satiation time, maximal food uptake, gut passage time and food utilization in the gut were determined for carp weighing between 2,5 and 50 g and in water temperatures ranging from 10 to 30°C in a flow-through system using the chromoxide-indicator method. A commercially available dry mixed fish food was used as feeding material. The size of the ration was 25, 50 and 100% of the maximal amount consumed under experimental conditions. The investigations on gut passage time and food utilization were performed both with and without re-feeding. Food utilization was determined for the total food material and its organic portion, as well as for its crude protein, crude carbohydrate, crude fat and crude ash components.

83-000588 Schmitz, O.; E. Greuel and E. Pfeffer. A METHOD FOR DETERMINING DIGESTIBILITY OF NUTRIENTS IN EELS. *Aquaculture* 32(1-2):71-78. Apr. 1983. In English with German summ. SFA 28(2)

[Inst. Anat. Physiol. Hygiene Haustiere, Univ. Bonn, D-5300 Bonn, West Germany] A method has been developed by which eels weighing between 150 and 300 g, individually confined within a cage, can be used for digestibility studies. Intake can be controlled by force feeding gelatin capsules containing known amounts of feed. Feces are removed from the water within less than 15 s after voiding by a continuously rotating paddle wheel. Standard deviations of less than 2% indicate a good reproducibility of results.

83-000589 Schwarz, F. J.; M. H. Zeitler and M. Kirchgessner. WACHSTUM UND NÄHRSTOFFAUFWAND BEI KARPFEN (*CYPRINUS CARPIO* L.) MIT UNTERSCHIEDLICHER PROTEIN- UND ENERGIEVERSORGUNG. 2. MITTEILUNG. GEWICHTSENTWICKLUNG, FUTTERVERWERTUNG, PROTEIN- UND ENERGIEAUFWAND. [GROWTH AND FEED CONVERSION OF CARPS (*CYPRINUS CARPIO* L.) IN DEPENDENCE ON VARIOUS PROTEIN AND ENERGY SUPPLY. 2. GROWTH, FEED CONVERSION, PER AND CONVERSION OF DIGESTIBLE ENERGY.] *J. Anim. Physiol. Anim. Nutr.* 49(2):88-98. Feb. 1983. In German with English summ. SFA 28(2)

[Inst. Ernahrugsphysiol., Univ. München, D-8050 Freising Weihenstephan, West Germany] Carps (*Cyprinus carpio* L.) held in aquariums (a total of 18 aquarium) with a mean live weight of 168 g received in two experiments (I and II) each six feed mixtures varying three times in the protein content and two times in the energy content. The experiments lasted a total of 93 days (I) with a growth period 1 of 52 days and a growth period 2 of 41 days and of 106 days (II) with 61 days and 45 days, respectively. The feed supply level was in average 2% of the live weight at a water temperature of 24°C per day. The carps gained a mean live weight of 660 g at the end of growth period 1 and of 1150 g at growth period 2 in experiment I. The increase of the crude protein content in the food dry matter (DM) from 41.3 to 46.5 and 51.4% did not influence the growth rate. The daily gain, however, improved significantly in both growth periods when the digestible energy (DE) increased from 18.3 to 20.1 MJ/kg DM. Regarding experiment II the carps weighted only 550 g, in the mean, at the end of growth period 1 and after period 2 890 g, respectively. The growth was not only decreased significantly by decreasing the protein supply (41.3 to 30.1 and to 19.9% in DM) but also by lowering the energy density (18.1 to 16.9 MJ DE/kg DM). The feed conversion (kg feed/kg gain) differed similar to the growth rate in both experiments. The mean feed conversion was 0.9 kg DM/kg gain in I and 1.2 kg DM/kg gain in II. PER distinctly impaired increasing protein supply, while the increase of the energy supply improved these measurements. The mean conversion of DE per kg gain was not influenced by the protein supply in trial I, whereas in trial II this value impaired with falling protein supply. The different energy supply only changed this conversion of DE per kg

FEEDS, FEEDING, AND NUTRITION (CONTINUED)

83-000589 CONTINUED gain in the growth period 1. This value increased rather with the higher energy supply in experiment I whereas the conversion decreased with rising DE from 16.9 to 18.2 MJ in experiment II. Recommendations for the protein and energy supply in complete diets for carps are discussed in regarding to these results.

83-000590 Spataru, P. A CONTRIBUTION TO THE STUDY OF THE NATURAL FOOD OF *SAROTHERODON* HYBRIDS GROWN UNDER CONDITIONS OF POLYCULTURE, SUPPLEMENTARY FEED AND INTENSIVE FERTILIZATION. *Bamidgeh* 34(4):144-157. Dec. 1982. SFA 28(2)

[Fish Aquacult. Res. Stn., Dor 30820, Israel] An investigation was carried out on the food of four *Sarotherodon* hybrids which were grown under polyculture conditions, with additional feed and intensive fertilization. It was shown that the hybrids' main food consisted of vegetable and animal detritus. The author's research and an analysis of the literature lead to the conclusion that the true species present in this polyculture investigation strongly out-compete the hybrids, by keeping them away from plankton or zoobenthos food sources. Considering the hybrids' inability to decompose the starch of *Sorghum durra*, it is advised to replace the latter by some other appropriate supplementary feed.

83-000591 Tacon, A. G. J. and S. S. De Silva. MINERAL COMPOSITION OF SOME COMMERCIAL FISH FEEDS AVAILABLE IN EUROPE. *Aquaculture* 31(1):11-20. Feb. 1983. SFA 28(2)

[Inst. Aquacult., Univ. Stirling, Stirling FK9 4LA, England] The concentrations of 14 mineral elements (Na, K, Ca, P, Mg, Fe, Zn, Cu, Mn, Co, Cr, Ni, Cd and Pb), together with pH, moisture, ash and NaCl content, were determined in 38 feeds commonly available in Europe for trout (starter, fingerling, grower, brood), salmon (starter, fingerling, grower), eel (grower), and larval fishes. Large differences in the mineral composition, particularly the trace elements Fe, Zn, Cu, Mn, Co and Pb, exist within and between the different feed categories tested. The results obtained are discussed in the context of available information on the dietary mineral requirements of these fish species.

83-000592 Takeuchi, T. and T. Watanabe. EFFECTS OF VARIOUS POLYUNSATURATED FATTY ACIDS ON GROWTH AND FATTY ACID COMPOSITIONS OF RAINBOW TROUT *SALMO GAIRDNERI*, COHO SALMON *ONCHORHYNCHUS KISUTCH*, AND CHUM SALMON *ONCHORHYNCHUS KETA*. *Bull. Jpn. Soc. Sci. Fish.* 48(12):1745-1752. Dec. 1982. SFA 28(2)

[Lab. Fish. Nutr., Tokyo Univ. Fish., Konan-4, Minato, Tokyo 108, Japan]

83-000593 Ufodike, E. B. C. and A. J. Matty. GROWTH RESPONSES AND NUTRIENT DIGESTIBILITY IN MIRROR CARP (*CYPRINUS CARPIO*) FED DIFFERENT LEVELS OF CASSAVA AND RICE. *Aquaculture* 31(1):41-50. Feb. 1983. SFA 28(2)

[Fish. Hydrobiol. Res. Unit, Dep. Zool., Univ. Jos, Nigeria] Mirror carp (*Cyprinus carpio*) fingerlings were fed for 10 weeks on isonitrogenous diets containing 15%, 30% or 45% of either cassava or rice and a control containing neither of these digestible carbohydrates. Nutrient digestibility, food utilization and tissue composition were studied. Results revealed that fish grew best on the 45% rice diet. Carbohydrate digestibility when cassava or rice was added to diet was high and ranged between 86% and 97%, but was very low (17%) when no cassava or rice was added. Protein digestibility was slightly raised from 76% (in the control) to between 83.5% and 88% with the addition of cassava or rice to the diets. Absence of appreciable quantity of digestible carbohydrate from diet probably led to the fish metabolising more fat for energy. Slight hypoglycaemia resulted when fish were fed diets devoid

FEEDS, FEEDING, AND NUTRITION (CONTINUED)

83-000593 CONTINUED of appreciable quantities of digestible carbohydrate. Dietary energy as carbohydrate is well utilized by mirror carp.

83-000594 Viola, S.; S. Mokady and Y. Arieli. EFFECTS OF SOYBEAN PROCESSING METHODS ON THE GROWTH OF CARP (*CYPRINUS CARPIO*). *Aquaculture* 32(1-2):27-38. Apr. 1983. SFA 28(2)
[Miloubar Cent. Feedmill, D.N. Asherat, Israel]

83-000595 Watanabe, T.; M. Ohta; C. Kitajima and S. Fujita. IMPROVEMENT OF DIETARY VALUE OF BRINE SHRIMP *ARTEMIA SALINA* FOR FISH LARVAE BY FEEDING THEM ON ω3 HIGHLY UNSATURATED FATTY ACIDS. *Bull. Jpn. Soc. Sci. Fish.* 48(12):1775-1782. Dec. 1982. SFA 28(2)
[Lab. Fish. Nutr., Tokyo Univ. Fish., Konan-4, Minato, Tokyo 108, Japan]

83-000596 Williamson, J. H. COMPARING TRAINING SUCCESS OF TWO STRAINS OF LARGEMOUTH BASS. *Prog. Fish-Cult.* 45(1):3-7. Jan. 1983. SFA 28(2)
[U.S. FWS, San Marcos Natl. Fish Hatchery Dev. Cent., Rt. 1, Box 159-D, San Marcos, TX 78666]

83-000597 Yamada, S.; Y. Tanaka; T. Katayama; M. Sameshima and K. L. Simpson. PLASMA AMINO CHANGES IN *TILAPIA NILOTICA* FED A CASEIN AND A CORRESPONDING FREE AMINO ACID DIET. *Bull. Jpn. Soc. Sci. Fish.* 48(12):1783-1787. Dec. 1982. SFA 28(2)
[Lab. Mar. Biochem., Fac. Fish., Univ. Kagoshima, 50-20, Shimoarata-4, Kagoshima 890, Japan]

83-000598 Zeitler, M. H.; F. J. Schwarz and M. Kirchgessner. WACHSTUM UND NÄHRSTOFFAUFWAND BEI KARPFEN (*CYPRINUS CARPIO* L.) MIT UNTERSCHIEDLICHER PROTEIN- UND ENERGIEVERSORGUNG. I. MITTEILUNG. VERSUCHSPLAN, RATIONSZUSAMMENSETZUNG, NÄHRSTOFFVERDAULICHKEIT. [GROWTH AND FEED CONVERSION OF CARPS (*CYPRINUS CARPIO* L.) IN DEPENDENCE ON VARIOUS PROTEIN AND ENERGY SUPPLY. I. EXPERIMENTAL DESIGN, COMPOSITION OF THE RATIOS, DIGESTIBILITY.] *J. Anim. Physiol. Anim. Nutr.* 49(2):80-87. Feb. 1983. In German with English summ. SFA 28(2)
[Inst. Ernahrungsphysiol., Univ. München, D-8050 Freising Weihenstephan, West Germany] The Influence of different energy (A) and proetin (B) supply on growth and feed conversion of carp (*Cyprinus carpio* L.) was studied in two factorial experimental design (2A X 3B). The experimental design, the composition of the rations, the nutrient content and the digestibility are described in the first paper. In experiment I the gross energy content varied between 19,6 MJ($A_{1\ I}$) and 21,5 MJ($A_{2\ I}$) and the crude protein content between 413 g($B_{1\ I}$) and 465 g ($B_{2\ I}$) and to 514 g ($B_{3\ I}$) per kg food dry matter (DM). The mean digestibility of the energy was 93.6% and of the crude protein 92.4%. The gross energy content in experiment II was in both energy treatments 19,6 MJ/kg DM. The digestibility, however, differed significantly about 7.5% (from 85.5% in $A_{1\ II}$ to 93.3% in $A_{2\ II}$) when 12% cellulose was added to the diet. The calculated digestible energy content was therefore, 16,9 MJ and 18,3 MJ/kg DM. The crude protein gradated from 199 g($B_{1\ II}$) to 301 g($B_{2\ II}$) and to 413 G($B_{3\ II}$) per kg DM with a mean digestibility of about 90%. The most important feed components of the diet were fish meal, isolated soy protein, wheat white middlings, maize starch, hardened fish oil, soy oil and sun flower oil.

AQUARIUMS

83-000599 Mumaw, L. MANAGING A SALMON PROPAGATION PROGRAM IN AN AQUARIUM. *Proc. Annu. Conf. Am. Assoc. Zool. Parks Aquariums* 1982:71-74. 1982. SFA 28(2)
[Seattle Aquarium, Seattle, WA]

83-000600 Tucker, T. ROCKFISH PROCUREMENT, HUSBANDRY, RESEARCH AND DISPLAY AT STEINHART AQUARIUM. *Proc. Annu. Conf. Am. Assoc. Zool. Parks Aquariums* 1982:122-123. 1982. SFA 28(2)

MISCELLANEOUS CULTURE TECHNIQUES AND EQUIPMENT

83-000601 Divanach, P.; M. Kentouri and J. Paris. RECHERCHES SUR LA PRODUCTION EXPLOITABLE AU NIVEAU AQUACOLE DANS DES LAGUNES À *ARTEMIA SALINA*. [RESEARCH ON POSSIBLE CROPS FOR AQUACULTURE IN *ARTEMIA SALINA* LAGOONS.] *C.R. Hebd. Seances Acad. Sci. Ser. III Sci. Vie* 296(1):29-31. 10 Jan. 1983. In French with English summ. SFA 28(2)
[Stn. Biol. Mar. Lagunaire, 34200 Séte, France]

83-000602 Haga, Y. ON THE SUBZERO TEMPERATURE PRESERVATION OF FERTILIZED EGGS OF RAINBOW TROUT. *Bull. Jpn. Soc. Sci. Fish.* 48(11):1569-1572. Nov. 1982. SFA 28(2)
[Tech. Cent., Tokyo Kyuei Co. Ltd., Shiba, Kawaguchi, Saitama 333, Japan] A possibility of preservation of fertilized eggs of rainbow trout *Salmo gairdneri* was examined at -7°C~-20°C for 3 hours. The results obtained are summarized as follows: 1. Eggs after eyed stage had higher tolerance for subzero temperature exposure than those of before eyed stage. 2. Suitable concentration of dimethyl sulfoxide (DMSO) as organic cryoprotectant was 1.4~ 2.1M. 3. In -7°C exposure, about 95% of hatching rate was obtained by using 10% calf serum and mineral salts solution besides DMSO as cryoprotectants, while 14% of hatching rate was obtained in -12°C exposure.

83-000603 Kerby, J. H. CRYOGENIC PRESERVATION OF SPERM FROM STRIPED BASS. *Trans. Am. Fish. Soc.* 112(1):86-94. Jan. 1983. SFA 28(2)
[N.C. Coop. Fish. Res. Unit, Box 5577, N.C. State Univ., Raleigh 27650]

83-000604 Millett, K. M.; J. G. Trial and J. G. Stanley. INEXPENSIVE MONITOR FOR AERATION MOTORS AND TRANSPORTATION TANKS. *Prog. Fish-Cult.* 45(1):59-60. Jan: 1983. SFA 28(2)
[Me. Coop. Fish. Res. Unit, Dep. Zool., Univ. Me., Orono 04469]

83-000605 Piironen, J. and H. Hyvärinen. CRYOPRESERVATION OF SPERMATOZOA OF THE WHITEFISH *COREGONUS MUKSUN* PALLAS. *J. Fish Biol.* 22(2):159-163. Feb. 1983. SFA 28(2)
[Dep. Biol., Univ. Joensuu, Box 111, SF-80101 Joensuu 10, Finland] The cryopreservation methods for whitefish, *Coregonus muksun*, spermatozoa were studied using six different extenders with -40°C and -196°C as storing temperatures. In 1980, the spermatozoa of individual fishes were frozen in dry ice, in vials containing three different media based on glycerol as cryoprotectant. The pure glycerol media resulted in a 20% average rate of fertilization. In 1981, the sperm of individual fishes was frozen in pellets and stored in liquid nitrogen. Cryopreserved semen thawed in 0.119M $NaHCO_3$ produced 29.6-87.7% eyed eggs. The differences were caused mainly by the type of extender. The highest rate of fertility was obtained using an extender consisting of 0.3M glucose with 20% glycerol (87.7% eyed eggs; 98.6% eyed eggs when compared to the corresponding control). The same

MISCELLANEOUS CULTURE TECHNIQUES AND EQUIPMENT (CONTINUED)

83-000605 CONTINUED values, using the modified extender of Stoss (Stoss & Refstie, in press), were 38.7-82.4% and, on the average, 90% eyed eggs, respectively.

83-000606 Shelton, J. L., Jr. and C. E. Boyd. CORRECTION FACTORS FOR CALCULATING OXYGEN-TRANSFER RATES OF POND AERATORS. *Trans. Am. Fish. Soc.* 112(1):120-122. Jan. 1983. SFA 28(2)
[Dep. Fish. Allied Aquacult., Auburn Univ., AL 36849]

83-000607 Stoss, J. and E. M. Donaldson. STUDIES ON CRYOPRESERVATION OF EGGS FROM RAINBOW TROUT *(SALMO GAIRDNERI)* AND COHO SALMON *(ONCORHYNCHUS KISUTCH). Aquaculture* 31(1):51-65. Feb. 1983. SFA 28(2)
[Dep. Fish. Oceans, 4160 Marine Dr., West Vancouver, BC V7V 1N6, Canada] The effect of pre-freezing treatments as well as freezing of inseminated, not water-activated eggs from rainbow trout *Salmo gairdneri*, and coho salmon, *Oncorhynchus kisutch*, was investigated in relation to survival and further development. Effects above freezing temperatures included: the temperature at insemination, viability of inseminated and unactivated eggs after storage, suitability of an incubation medium and the tolerance of eggs to various levels of the cryoprotectant dimethylsulfoxide (DMSO). Freezing experiments included: investigating the action of DMSO (0, 1, 2 mole) and the tolerance of coho eggs to temperatures between -4.6 to -30°C. Insemination temperatures between 0.5°C and 9.8°C (coho eggs) as well as incubation in an artificial medium (1-0°C) for 80 min (rainbow trout eggs) and 170 min (coho eggs) did not influence subsequent fertility. Storage of inseminated and unactivated rainbow trout eggs for 135 min and beyond reduced egg fertility. DMSO at 2 and 4 mole was detrimental to coho eggs (1-0°C). One mole DMSO had no (coho) or reduced (rainbow trout) influence on egg fertility when it was added gradually. In the presence of 1 mole DMSO most eggs remained unfrozen (67-89%) when kept for 10 min in forzen artificial medium (-4.6%) and 27-32% subsequently reached the eyed stage (control=100). Further cooling (0.3°C/min) to -10°C was still tolerated (62% unfrozen, 22% eyed eggs) but not to -20°C (6% unfrozen, no development) and -30°C (no survival). Use of 2 mole DMSO did not improve the results.

PHYSICAL LIMNOLOGY AND OCEANOGRAPHY

83-000608 Kruse, G. H. and A. Huyer. RELATIONSHIPS AMONG SHELF TEMPERATURES, COASTAL SEA LEVEL, AND THE COASTAL UPWELLING INDEX OFF NEWPORT, OREGON. *Can. J. Fish. Aquatic Sci.* 40(2):238-242. Feb. 1983. SFA 28(2)
[Dep. Fish. Wildl., Oreg. State Univ., Corvallis 97331]

CHEMICAL LIMNOLOGY AND OCEANOGRAPHY

83-000609 Lean, D. R. S. and E. White. CHEMICAL AND RADIOTRACER MEASUREMENTS OF PHOSPHORUS UPTAKE BY LAKE PLANKTON. *Can. J. Fish. Aquatic Sci.* 40(2):147-155. Feb. 1983. SFA 28(2)
[Natl. Water Res. Inst., P.O. Box 5050, Burlington, ON L7R 4A6, Canada]

PLANKTON

83-000610 Planas, D. and A. Lamarche. LACK OF EFFECT OF ARSENIC ON PHYTOPLANKTON COMMUNITIES IN DIFFERENT NUTRIENT CONDITIONS. *Can. J. Fish. Aquatic Sci.* 40(2):156-161. Feb. 1983. SFA 28(2)

PLANKTON (CONTINUED)

83-000610 CONTINUED
[Dep. Sci. Biol., Univ. Quebec, Montreal C.P. 8888, Succursale "A", Montreal, PQ H3C 3P8, Canada]

PRIMARY PRODUCTION

83-000611 Hoyer, M. V. and J. R. Jones. FACTORS AFFECTING THE RELATION BETWEEN PHOSPHORUS AND CHLOROPHYLL *A* IN MIDWESTERN RESERVOIRS. *Can. J. Fish. Aquatic Sci.* 40(2):192-199. Feb. 1983. SFA 28(2)
[Sch. For. Fish. Wildl., 112 Stephens Hall, Univ. Mo., Columbus 65211]

MORPHOLOGY

83-000612 Anderson, C. EVIDENCE FOR 5-HT-CONTAINING INTRINSIC NEURONS IN THE TELEOST INTESTINE. *Cell Tissue Res.* 230(2):377-386. Mar. 1983. SFA 28(2)
[Dep. Zool., Univ. Melbourne, Parkville, Victoria, Australia]

83-000613 Ans, R. A.; B. L. Meyler and V. A. Sammelsel'g. AUTOLITH GROWTH ZONE STRUCTURE IN THE BALTIC SPRAT *SPRATTUS SPRATTUS BALTICUS* (G. SCHNEIDER) (CLUPEIDAE). *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):156-160. 1982. SFA 28(2)
[Balt NIIRKH, Tallin, USSR] The summer periods of intensive growth of the Baltic sprat correspond to relatively more transparent or hyalin zones, the slower winter growth periods correspond to the relatively less transparent or opaque zones of their otoliths. The winter opaque zones of the Baltic sprat otoliths contain relatively more organic matter than the summer hyalin zones.--Concl.

83-000614 Appelbaum, S.; J. W. Adron; S. G. George; A. M. Mackie and B. J. S. Pirei. ON THE DEVELOPMENT OF THE OLFACTORY AND THE GUSTATORY ORGANS OF THE DOVER SOLE, *SOLEA SOLEA*, DURING METAMORPHOSIS. *J. Mar. Biol. Assoc. U.K.* 63(1):97-108. Feb. 1983. SFA 28(2)
[Bundesforsch. Fisch., Inst. Kusten Binnenfisch., Palmaille 9, Hamburg 50, West Germany]

83-000615 Barco, D. del and A. Panattieri. UN CASO DE ALBINISMO EN ARMADO CHANCHO (*OXYDORAS KNERI*, BLEEKER 1862. PISCES - DORADIDAE). [A CASE OF ALBINISM IN *OXYDORAS KNERI*, BLEEKER 1862, PISCES, DORADIDAE.] *Comun. Mus. Prov. Cienc. Nat. Florentino Ameghino* No. 9. p. 1-9. 1981. In Spanish with English summ. SFA 28(2)
[Div. Prod. Pesq. Ictiol., Minist. Agric. Ganad. Prov. Santa Fe, Av. Aristobulo de Valle 8700, (3000) Santa Fe, Argentina]

83-000616 Barlow, G. W. THE BENEFITS OF BEING GOLD: BEHAVIORAL CONSEQUENCES OF POLYCHROMATISM IN THE MIDAS CICHLID, *CICHLASOMA CITRINELLUM*. *Environ. Biol. Fishes* 8(3-4):235-247. 1 Mar. 1983. SFA 28(2)
[Dep. Zool., Univ. Calif., Berkeley 94720] The midas cichlid, *Cichlasoma citrinellum*, occurs in the lakes of Nicaragua. In semi-turbid to turbid lakes about 8% of the adult are amelanic, having lost their melanophores at various ages, and are thus yellow through red and sometimes white. The commonest hues are yellow through orange, called gold. Gold morphs ought to be selected against because they are probably conspicuous to predators and

MORPHOLOGY (CONTINUED)

83-000616 CONTINUED they cannot communicate by changing markings. To maintain the polymorphism, gold coloration must have offsetting advantages. Gold morphs dominate normal ones of equal size, and that imporves their access to limiting resources. Gold morphs, however, do not seem to be intrinsically more aggressive but rather attain dominance through the effect of their color on their opponents. The gold effect is affected by experience; it is enhanced by sharing the color of the dominant fish in a group, and by being rare. The midas cichlid mates assortatively but imperfectly. Choice of mate is influenced by color of self and of parents and can be constrained by size-color relationship.

83-000617 Bergeron, T. and B. Woodward. ULTRASTRUCTURE OF THE GRANULE CELLS IN THE SMALL INTESTINE OF THE RAINBOW TROUT (*SALMO GAIRDNERI*) BEFORE AND AFTER STRATUM GRANULOSUM FORMATION. *Can. J. Zool.* 61(1):133-138. Jan. 1983. In English with French summ. SFA 28(2)
[B. Woodward: Dep. Nutr., Coll. Biol. Sci., Univ. Guelph, Guelph, ON N1G 2W1, Canada]

83-000618 Blaxhall, P. C. ELECTRON MICROSCOPE STUDIES OF FISH LYMPHOCYTES AND THROMBOCYTES. *J. Fish Biol.* 22(2):223-229. Feb. 1983. SFA 28(2)
[Life Sci. Dep., Trent Polytech., Nottingham, England]

83-000619 Borisovets, Y. E. DISCRIMINATE ANALYSIS OF DIADROMOUS CHAR OF THE GENUS *SALVELINUS* (SALMONIDAE) OF THE CHUKOTSK PENINSULA. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):11-19. 1982. SFA 28(2)

83-000620 Brown, J. A.; S. M. Taylor and C. J. Gray. GLOMERULAR ULTRASTRUCTURE OF THE TROUT, *SALMO GAIRDNERI*. GLOMERULAR CAPILLARY EPITHELIUM AND THE EFFECTS OF ENVIRONMENTAL SALINITY. *Cell Tissue Res.* 230(1):205-218. Mar. 1983. SFA 28(2)
[Dep. Zool., Univ. Hull, Hull HU6 7RX, England]

83-000621 Coburn, M. M. ANATOMY AND RELATIONSHIPS OF *NOTROPIS ATHERINOIDES. Ph.D. dissertation, Ohio State Univ.* 401p. 1982. From Diss. Abstr. Int. B Sci. Eng. 43(8):2472. Feb. 1983. SFA 28(2)

83-000622 Feller, G.; R. Bassleer; G. Goessens and G. Hamoir. RELATIVE SIZE AND MYOCARDIAL STRUCTURE OF THE HEART OF AN ANTARCTIC FISH DEVOID OF HAEMOGLOBIN AND MYOGLOBIN, *CHANNICHTHYS RHINOCERATUS. J. Zool. (Lond.)* 199(1):51-57. Jan. 1983. SFA 28(2)
[Lab. Biochim. Musculaire, Inst. Chim., Sart Tilman, 400 Liège, Belgium]

83-000623 Fursa, T. I. EMBRYONAL AND EARLY POSTEMBRYONAL DEVELOPMENT OF THE ESO LIZARDFISH *SAURID UNDOSQUAMIS* (RICHARDSON) (SYNODONTIDAE) FROM THE ARABIAN SEA. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):161-164. 1982. SFA 28(2)
[AzcherNIRO, Kerch, USSR]

83-000624 Giraud, A. S. and N. D. Yeomans. CELL TYPES OF THE GASTRIC MUCOSA OF A TELEOST, THE RIVER BLACKFISH, *GADOPSIS MARMORATUS. Aust. J. Mar. Freshwater Res.* 33(6):1103-1108. 1982. SFA 28(2)
[Dep. Med., Univ. Melbourne, Austin Hosp., Heidelberg, Victoria 3084, Australia]

MORPHOLOGY (CONTINUED)

83-000625 Hampl, A.; J. Jirásek and D. Sirotek. GROWTH MORPHOLOGY OF THE FILTERING APPARATUS OF SILVER CARP (*HYPOPHTHALMICHTHYS MOLITRIX*) II. MICROSCOPIC ANATOMY. *Aquaculture* 31(2-4):153-158. Mar. 1983. SFA 28(2)
[Dep. Morphol. Physiol. Farm Anim., Fac. Agron., Univ. Agric., Brno, Czechoslovakia]

83-000626 Hibiya, T., (ed.). AN ATLAS OF FISH HISTOLOGY. NORMAL AND PATHOLOGICAL FEATURES. *Kodanacha Ltd., Tokyo*. xi + 147p. 1982. Available from Gustav Fischer Verlag Publ., Postfach 720143, D-7000 Stuttgart 70, West Germany. SFA 28(2)

83-000627 Hirji, K. N. OBSERVATIONS ON THE HISTOLOGY AND HISTOCHEMISTRY OF THE OESOPHAGUS OF THE PERCH, *PERCA FLUVIATILIS* L. *J. Fish Biol.* 22(2):145-152. Feb. 1983. SFA 28(2)
[Dep. Zool., Univ. Dar Es Salaam, P.O. Box 35064, Dar Es Salaam, Tanzania]

83-000628 Hossler, F. E. and L. H. Merchant. MORPHOLOGY OF TASTE BUDS ON THE GILL ARCHES OF THE MULLET *MUGIL CEPHALUS*, AND THE KILLIFISH *FUNDULUS HETEROCLITUS*. *Am. J. Anat.* 166(3):299-312. Mar. 1983. SFA 28(2)
[Dep. Anat., Box 19960A, Quillen-Dishner Coll. Med., East Tenn. State Univ., Johnson City 37614]

83-000629 Huysseune, A. OBSERVATIONS ON TOOTH DEVELOPMENT AND IMPLANTATION IN THE UPPER PHARYNGEAL JAWS IN *ASTATOTILAPIA ELEGANS* (TELEOSTEI, CICHLIDAE). *J. Morphol.* 175(3):217-234. Mar. 1983. SFA 28(2)
[Lab. Morfol. Syst. Dieren, Rijksuniv. Gent, 9000 Gent, Belgium]

83-000630 Ismail, M. H.; W. Verraes and A. Huysseune. DEVELOPMENTAL ASPECTS OF THE PHARYNGEAL JAWS IN *ASTATOTILAPIA ELEGANS* (TREWAVAS, 1933) (TELEOSTEI: CICHLIDAE). *Neth. J. Zool.* 32(4):513-543. Dec. 1982. SFA 28(2)
[Lab. Morphol. Syst. Dieren, Ledegonckstr. 35, B-9000 Gent, Belgium]

83-000631 Kaeriyama, M. and T. Bunya. [MORPHOLOGICAL AND ECOLOGICAL CHARACTERISTICS OF PHASIC DEVELOPMENT FROM FRY TO FINGERLING IN THE CHUM SALMON.] *Bull. Jpn. Soc. Sci. Fish.* 48(11):1537-1544. Nov. 1982. In Japanese with English summ. SFA 28(2)
[Kesennuma Miyagi Pref. Fish. Exp. Stn., Hashigami-Uchinuma 119, Kesennuma, Miyagi 988-02, Japan]

83-000632 Lauder, G. V. FUNCTIONAL DESIGN AND EVOLUTION OF THE PHARYNGEAL JAW APPARATUS IN EUTELEOSTEAN FISHES. *Zool. J. Linn. Soc.* 77(1):1-38. Jan. 1983. SFA 28(2)
[Dep. Anat., Univ. Chicago, 1025 East 57th Street, Chicago, IL 60637]

83-000633 Lythgoe, J. N. and J. Shand. DIEL COLOUR CHANGES IN THE NEON TETRA *PARACHEIRODON INNESI*. *Environ. Biol. Fishes* 8(3-4):249-254. 1 Mar. 1983. SFA 28(2)
[Dep. Zool., Univ. Bristol, Woodland Rd., Bristol BS8 1UG, England] In the daytime the neon tetra *Paracheirodon innesi* has an iridescent blue-green lateral stripe and a red ventral area. At night the lateral stripe becomes deep violet and the ventral area fades. The iridescent colours are produced by constructive interference from regular stacks of thin reflecting plates in dermal iridophores. Colour changes of the reflected light result from

MORPHOLOGY (CONTINUED)

83-000633 CONTINUED changes in the spacing of the plates which is caused by the direct action of light on the skin, and also by emotional arousal. Fading in the red areas is due to the migration of pigment granules within the chromatophore. On the basis of existing measurements of spectral transmission of Amazon waters, where the fish are thought to live in nature, and microspector-photometric measurements of visual pigments in the visual cells it is concluded that neon and cardinal tetras are conspicuous in the daytime when they are active, and camouflaged at night when the are inactive.

83-000634 MacCrimmon, H. R.; B. L. Gots and R. R. Claytor. EXAMINATION OF POSSIBLE TAXONOMIC DIFFERENCES WITHIN LAKE ERIE RAINBOW SMELT, *OSMERUS MORDAX* (MITCHILL). *Can. J. Zool.* 61(2):326-338. Feb. 1983. In English with French summ. SFA 28(2)

[Dep. Zool., Univ. Guelph, Guelph, ON N1G 2W1, Canada] Random samples of rainbow smelt, *Osmerus mordax*, from commerical summer trawl harvests in the Central and Eastern basins of Lake Erie are examined. Analysis of the meristic, morphometric, and electrophoretic data indicates no statistical evidence of genetic differences between basin populations. However, significant differences in size and growth data between basin populations occur and are attributed to differences in limnological conditions between basins which affect the time of spawning, length of growing season, and growth rate. Thus, these differences indicate an ecophenotypic distinction between the Central and Eastern Basin populations because of between-basin limnological dissimilarities.

83-000635 Masai, H.; K. Takatsuji; Y. Sato and Y. Ojima. MORPHOLOGICAL VARIATION IN CRUCIAN BRAINS, WITH SPECIAL REFERENCE TO THE ORIGIN OF THE GOLDFISH. *Z. Zool. Syst. Evolutionsforsch.* 20(4):296-301. Dec. 1982. SFA 28(2)

[Dep. Anat., Osaka Univ. Med. Sch., Osaka, Japan]

83-000636 Massoud, A. A.; B. A. Simco and K. B. Davis. ANNUAL CHANGES IN BASOPHILIC CELL TYPES IN THE PITUITARY GLAND OF CHANNEL CATFISH, *ICTALURUS PUNCTATUS*. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(3):513-520. 1983. SFA 28(2)

[Zool. Dep., Fac. Sci., Tanta Univ., Tanta, Egypt]

83-000637 McElman, J. F. COMPARATIVE EMBRYONIC ECOMORPHOLOGY AND THE REPRODUCTIVE GUILD CLASSIFICATION OF WALLEYE, *STIZOSTEDION VITREUM*, WHITE SUCKER, *CATOSTOMUS COMMERSONI*. *Copeia* 1983(1):246-250. 10 Feb. 1983. SFA 28(2)

[Dep. Fish. Oceans, Biol. Stn., St. Andrews, NB E0G 2X0, Canada]

83-000638 Meister, M. F.; W. Humbert; R. Kirsch and B. Vivien-Roels. STRUCTURE AND ULTRASTRUCTURE OF THE OESOPHAGUS IN SEA-WATER AND FRESH-WATER TELEOSTS (PISCES). *Zoomorphology* 102(1):33-51. Feb. 1983. SFA 28(2)

[Lab. Zool. Embryol. Exp., F-67000 Strasbourg, France]

83-000639 Nieuwenhuys, R. and P. L. Oey. TOPOLOGICAL ANALYSIS OF THE BRAINSTEM OF THE REEDFISH, *ERPETOICHTHYS CALABARICUS*. *J. Comp. Neurol.* 213(2):220-232. 10 Jan. 1983. SFA 28(2)

[Dep. Anat., Univ. Nijmegen, Nijmegen, Netherlands]

MORPHOLOGY (CONTINUED)

83-000640 Oelschläger, H. A. VERGLEICHENDE UND FUNKTIONELLE ANATOMIE DER ALLOTRIOGNATHI (=LAMPRIDIFORMES), EIN BEITRAG ZUR EVOLUTIONSMORPHOLOGIE DER KNOCHENFISCHE. [COMPARATIVE AND FUNCTIONAL ANATOMY OF ALLOTRIOGNATHI (=LAMPRIDIFORMES), A CONTRIBUTION TO THE EVOLUTIONARY MORPHOLOGY OF BONEY FISH.] *Abh. Senckenb. Naturforsch. Ges.* 541:1-127. 1983. In German with English summ. SFA 28(2)
[Senckenb. Anat., Johann Wolfgang Goethe-Univ., Frankfort, West Germany]

83-000641 Pezold, F. L. and R. C. Cashner. A CHARACTER ANALYSIS OF *GOBIONELLUS BOLEOSOMA* AND *G. SHUFELDTI* (PISCES: GOBIIDAE) FROM THE NORTH-CENTRAL GULF OF MEXICO. *Northeast Gulf Sci.* 6(1):71-77. Feb. 1983. SFA 28(2)
[Dep. Zool., Univ. Tex., Austin 78712]

83-000642 Schoots, A. F. M.; P. A. C. M. Evertse and J. M. Denucé. ULTRASTRUCTURAL CHANGES IN HATCHING-GLAND CELLS OF PIKE EMBRYOS (*ESOX LUCIUS* L.) AND EVIDENCE FOR THEIR DEGENERATION BY APOPTOSIS. Cell Tissue Res. 229(3):573-589. Feb. 1983. SFA 28(2)
[Dep. Zool., Katholieke Univ., Nijmegen, Netherlands]

83-000643 Su, J. and W. Li. [A STUDY OF THE PATTERNS OF THE OLFACTORY ORGAN OF TETRAODONTIFORM FISHES IN CHINA.] *Acta Zool. Sin.* 28(4):389-398. 1982. In Chinese with English summ. SFA 28(2)
[Shanghai Fish. Coll., Shanghai, China]

83-000644 Theisen, B. FUNCTIONAL MORPHOLOGY OF THE OLFACTORY ORGAN IN *SPINACHIA SPINACHIA* (L.) (TELEOSTEI, GASTEROSTEIDAE). *Acta Zool. (Stockh.)* 63(4):247-254. 1982. SFA 28(2)
[Inst. Comp. Anat., Univ. Copenhagen, Universitetsparken 15, DK-2100 Copenhagen Ø, Denmark]

83-000645 Thurmon, G. pH SIGNALING BY *CHROMILEPTIS ALTIVELIS*. *J. Aquaricult. Aquatic Sci.* 3(2):28-30. 1982. SFA 28(2)
[507 E. 4th St., Salisburg, MO 65281]

83-000646 Vasil'eva, Y. D. OSTEOLOGIC ANALYSIS OF ALTAI OSMANS OF THE GENUS *OREOLEUCISCUS* (CYPRINIDAE) FROM LAKE NOGON (MONGOLIA). *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):20-28. 1982. SFA 28(2)

83-000647 Verigina, I. A. HISTOLOGICAL STRUCTURE OF THE DIGESTIVE TRACT OF *XENODERMICHTHYS COPEI* (ALEPOCHEPHALIDAE). *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):98-103. 1982. SFA 28(2)
[Zool. Mus., Moscow State Univ., USSR]

83-000648 Watanabe, Y. [ULTRASTRUCTURE OF EPITHELIAL CELLS OF THE ANTEROMEDIAN INTESTINE AND THE RECTUM IN LARVAL AND JUVENILE TELEOSTS.] *Bull. Fac. Fish. Hokkaido Univ.* 33(4):217-228. Nov. 1982. In Japanese with English summ. SFA 28(2)
[Lab. Physiol. Ecol., Fac. Fish., Hokkaido Univ., Japan]

MORPHOLOGY (CONTINUED)

83-000649 Zbikowska, L. CECHY BIOMETRYCZNE SCCZZUPAKA (*ESOX LUCIUS* L.) Z JEZIORA ŚNIARDWY. [BIOMETRIC FEATURES OF THE PIKE (*ESOX LUCIUS* L.) FROM LAKE SNIARDWY.] *Zesz. Nauk. Akad. Roln. Tech. Olsz* 11:89-99. 1980. In Polish with English summ. SFA 28(2)
[Inst. Hydrobiol., Olsztyn, Poland]

83-000650 Zenzerov, V. S. STRUCTURAL PECULIARITIES OF THE THYROID GLAND OF BARENTS SEA HADDOCK, *MELANOGRAMMUS AEGLEFINUS* (GADIDAE). *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):104-109. 1982. SFA 28(2)
[Murmansk Mar. Biol. Inst., Kola Br., Acad. Sci. USSR, Dal'nie Zelentsy, USSR]

83-000651 Zihler, F. GROSS MORPHOLOGY AND CONFIGURATION OF DIGESTIVE TRACTS OF CICHLIDAE (TELEOSTEI, PERCIFORMES): PHYLOGENETIC AND FUNCTIONAL SIGNIFICANCE. *Neth. J. Zool.* 32(4):544-571. Dec. 1982. SFA 28(2)
[Zool. Mus., Univ. Zurich-Irchel, Winterhurerstr. 190, CH-8057 Zurich, Switzerland]

83-000652 Zuasti, A.; B. Agulleiro and F. Hernandez. ULTRASTRUCTURE OF THE KIDNEY OF THE MARINE TELEOST *SPARUS AURATUS*: THE RENAL CORPUSCLE AND THE TUBULAR NEPHRON. *Cell Tissue Res.* 228(1):99-106. Jan. 1983. SFA 28(2)
[B. Agulleiro: Dep. Cytol. Histol., Univ. Murcia, Spain]

PHYSIOLOGY

83-000653 Abo Hegab, S. and W. Hanke. THE SIGNIFICANCE OF THE AMINO ACIDS DURING OSMOTIC ADJUSTMENT IN TELEOST FISH--II. CHANGES IN THE STENOHALINE *CYPRINUS CARPIO*. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(3):537-543. 1983. SFA 28(2)
[Dep. Zool., The University, D-75000 Karlsruhe, West Germany]

83-000654 Agius, C. ON THE FAILURE TO DETECT HAEMOSIDERIN IN THE MELANO-MACROPHAGES OF DOGFISH *SCYLIORHINUS CANICULA* (L.) AFTER PROLONGED STARVATION. *Experientia (Basel)* 39(1):64-66. 15 Jan. 1983. SFA 28(2)
[Inst. Aquacult., Univ. Stirling, Stirling FK9 4LA, Scotland]

83-000655 Agrawal, N. K. and C. L. Mahajan. HAEMATOLOGICAL AND HAEMATOPOIETIC STUDIES IN PYRIDOXINE DEFICIENT FISH, *CHANNA PUNCTATUS* BLOCH. *J. Fish Biol.* 22(1):91-103. Jan. 1983. SFA 28(2)
[Aquatic Fish Biol. Lab., Dep. Zool., Univ. Rajasthan, Jaipur, India]

83-000656 Assem, H. and W. Hanke. THE SIGNIFICANCE OF THE AMINO ACIDS DURING OSMOTIC ADJUSTMENT IN TELEOST FISH--I. CHANGES IN THE EURYHALINE *SAROTHERODON MOSSAMBICUS*. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(3):531-536. 1983. SFA 28(2)
[W. Hanke: Dep. Zool., The University, D-7500 Karlsruke, West Germany]

83-000657 Barannikova, I. A. and T. A. Fadeeva. GONADOTROPIC FUNCTION OF THE PITUITARY OF SEVRUGA, *ACIPENSER STELLATUS*, DURING THE MARINE PERIOD OF LIFE. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):110-116. 1982.

PHYSIOLOGY (CONTINUED)

83-000657 CONTINUED SFA 28(2)
[VNIRO, Moscow, USSR]

83-000658 Barker, C. J.; M. L. Beck and C. J. Biggers. HEMATOLOGIC AND ENZYMATIC ANALYSIS OF *CTENOPHARYNGODON IDELLA* X *HYPOPHTHALMICHTHYS NOBILIS* F_1 HYBRIDS. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(4):915-918. 1983. SFA 28(2)
[Dep. Biol., Memphis State Univ., Memphis, TN 38152]

83-000659 Bauermeister, A.; A. Lewendon; P. I. N. Ramage and I. A. Nimmo. DISTRIBUTION AND SOME PROPERTIES OF THE GLUTATHIONE *S*-TRANSFERASE AND γ-GLUTAMYL TRANSPEPTIDASE ACTIVITIES OF RAINBOW TROUT. *Comp. Biochem. Physiol. C Comp. Pharmacol. Toxicol.* 74(1):89-93. 1983. SFA 28(2)
[I.A. Nimmo: Dep. Biochem., Univ. Edinburgh Med. Sch., Hugh Robson Bldg., George Square, Edinburgh EH8 9XD, Scotland]

83-000660 Beacham, T. D. VARIABILITY IN SIZE AND AGE AT SEXUAL MATURITY OF ARGENTINE, *ARGENTINA SILUS*, ON THE SCOTIAN SHELF IN THE NORTHWEST ATLANTIC OCEAN. *Environ. Biol. Fishes* 8(1):67-72. 1 Jan. 1983. SFA 28(2)
[Dep. Fish. Oceans, Resour. Serv. Br., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada] The variability in the length and age at which 50% of individuals were mature was investigated for argentine (*Argentina silus*) in the Northwest Atlantic. Median length at maturity generally declined with time, the trend more pronounced in females than in males. Males and females matured at similar lengths, but males tended to mature at older ages. From 1965-1969, median length at maturity for males ranged from 35.4 cm in NAFO Subdiv. 4Vs to 26.4 cm in Div. 4W, while that for females ranged from 28.0 cm in Subdiv. 4Vs to 24.9 in Subdiv. 5Ze. From 1965-1969, median age at maturity was about 5.3 yr for males and 4.6 yr for females.

83-000661 Bell, M. V.; K. F. Kelly and J. R. Sargent. THE TRANSPORT OF ORTHOVANADATE AND SIMILAR OXYANIONS IN RELATION TO SALT AND WATER TRANSPORT ACROSS THE ISOLATED INTESTINE OF THE COMMON EEL, *ANGUILLA ANGUILLA*. *J. Exp. Biol.* 102:295-305. Jan. 1983. SFA 28(2)
[NERC Inst. Mar. Biochem., St. Fitticks Rd., Aberdeen, AB1 3RA, U.K.]

83-000662 Belova, N. V. ECOLOGICAL AND PHYSIOLOGICAL PROPERTIES OF THE SEMEN OF POND CYPRINIDS. III. PHYSIOLOGICAL-BIOCHEMICAL PARAMETERS OF THE SEMEN OF SOME CYPRINID SPECIES. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):63-80. 1982. SFA 28(2)
[Biol. Fac., Moscow State Univ., Moscow, USSR]

83-000663 Bird, D. J. and I. C. Potter. PROXIMATE COMPOSITION AT VARIOUS STAGES OF ADULT LIFE IN THE SOUTHERN HEMISPHERE LAMPREY, *GEOTRIA AUSTRALIS* GRAY. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(3):623-633. 1983. SFA 28(2)
[Sch. Environ. Life Sci., Murdoch Univ., Murdoch, W.A. 6150, Australia]

83-000664 Björnsson, B. T. and T. Hansson. EFFECTS OF HYPOPHYSECTOMY ON THE PLASMA IONIC AND OSMOTIC BALANCE IN RAINBOW TROUT, *SALMO GAIRDNERI*. *Gen. Comp. Endocrinol.* 49(2):240-247. Feb. 1983. SFA 28(2)

PHYSIOLOGY (CONTINUED)

83-000664 CONTINUED
[Dep. Zoophysiol., Univ. Göteborg, Box 250 59, S-400 31 Gothenburg, Sweden]

83-000665 Bone, Q. and A. D. Chubb. THE RETIAL SYSTEM OF THE LOCOMOTOR MUSCLES IN THE THRESHER SHARK. *J. Mar. Biol. Assoc. U.K.* 63(1):239-241. Feb. 1983. SFA 28(2)
[Mar. Biol. Assoc., Citadel Hill, Plymouth PL 1 2PB, England] The red muscle of the thresher-shark myotome in internalized and supplied by a simple rete in connexion with lateral vessels. It is probable that the system enables the fish to be warm-bodied.

83-000666 Boreman, J. SIMULATION OF STRIPED BASS EGG AND LARVA DEVELOPMENT BASED ON TEMPERATURE. *Trans. Am. Fish. Soc.* 112(2B):286-292. Mar. 1983. SFA 28(2)
[NMFS, Woods Hole, MA 02543]

83-000667 Borg, B. and R. Van Den Hurk. OOCYTES IN THE TESTES OF THE THREE-SPINED STICKLEBACK, *GASTEROSTEUS ACULEATUS*. *Copeia* 1983(1):259-261. 10 Feb. 1983. SFA 28(2)
[Dep. Zool., Univ. Lund, Lund, Sweden]

83-000668 Bourne, P. K. and A. R. Cossins. ON THE INSTABILITY OF K+ INFLUX IN ERYTHROCYTES OF THE RAINBOW TROUT, *SALMO GAIRDNERI*, AND THE ROLE OF CATECHOLAMINE HORMONES IN MAINTAINING *IN VIVO* INFLUX ACTIVITY. *J. Exp. Biol.* 101:93-104. Dec. 1982. SFA 28(2)
[Dep. Zool., Univ. Liverpool, P.O. Box 147, Liverpool L69 3BX, England]

83-000669 Burton, V. A. and W. A. Gern. A DIEL CYCLE OBSERVED FOR MELATONIN IN THE PINEAL BODY OF RAINBOW TROUT. *J. Colo.-Wyo. Acad. Sci.* 15(1):59. Apr. 1983. Abstract only. SFA 28(2)

83-000670 Carey, F. G. and Q. H. Gibson. HEAT AND OXYGEN EXCHANGE IN THE RETE MIRABILE OF THE BLUEFIN TUNA, *THUNNUS THYNNUS*. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(2):333-342. 1983. SFA 28(2)
[Woods Hole Oceanogr. Inst., Woods Hole, MA 02543] In order to achieve muscle temperatures which may be in excess of 15°C above the surroundings, the vascular heat exchange system in the bluefin tuna, *Thunnus thynnus*, is required to operate with efficiencies approaching 99%. With this high efficiency of heat exchange, it is expected that some oxygen as well as heat will be exchanged between the arterial and venous blood. Bluefin tuna hemoglobin shows a reverse temperature dependence for oxygenation which would reduce such oxygen loss from the arterial blood. The molecular mechanism for this effect entails an enhanced temperature dependence of the allosteric parameter *L* which outweighs normal temperature dependence of the intrinsic heme affinities.

83-000671 Chakraborti, P.; D. K. Rakshit and S. Bhattacharya. INFLUENCE OF SEASON, GONADOTROPINS, AND GONADAL HORMONES ON THE THYROID ACTIVITY OF FRESHWATER PERCH, *ANABAS TESTUDINEUS* (BLOCH). *Can. J. Zool.* 61(2):359-364. Feb. 1983. In English with French summ. SFA 28(2)
[S. Bhattacharya: Sch. Life Sci., Dep. Zool., Visva-Bharatie Univ., Santiniketan 731 235, West Bengal, India]

PHYSIOLOGY (CONTINUED)

83-000672 Chervinski, J. SALINITY TOLERANCE OF THE MOSQUITO FISH, *GAMBUSIA AFFINIS* (BAIRD AND GIRARD). *J. Fish Biol.* 22(1):9-11. Jan. 1983. SFA 28(2)
[Dep. Fish., P.O. Box 699, Haifa 31000, Israel] Experiments were conducted to determine the adaptability of mosquito fish to various salt concentrations. Mosquito fish, *Gambusia affinis*, (total length (T.L.) 27-37 mm) were subjected to abrupt and gradual changes from fresh water to various salinities (S). Low mortality (10%) occurred when the fish were transferred from fresh water (S = 0.5°/oo) to 50% sea water (S = 19.5°/oo). Through gradual adaptation 65.0% of the fish were able to tolerate 100% sea water for 7 days. After a 7-day stay in sea water fish were readapted to fresh water during a 3-h period. The results indicate that they were well able to tolerate the abrupt change. Through a gradual adaptation fish were also able to tolerate salinities ranging from 39.0°/oo (100% sea water) to 58.8°/oo.

83-000673 Coleman, F. *HEMANTHIAS PERUANUS*, ANOTHER HERMAPHRODITIC ANTHIINE SERRANID. *Copeia* 1983(1):252-253. 10 Feb. 1983. SFA 28(2)
[RD 3, Box 346, Trumansburg, NY 14886]

83-000674 Cordier-Perroy, L.; P. Deschaux and G. Peres. INFLUENCE OF BREEDING TEMPERATURE ON AN ANTIBODY RESPONSE (ANTI SRBC) IN A TELEOSTEAN FISH, *DICENTRARCHUS LABRAX*. *Experientia (Basel)* 39(1):84-85. 15 Jan. 1983. SFA 28(2)
[Univ. Limoges, UER Sci., Lab. Immunophysiol. Gen. Comp., 123 rue Albert Thomas, F-87060 Limoges Cedex, France]

83-000675 D'yakonov, Y. N. INFLUENCE OF TEMPERATURE ON CARDIAC ACTIVITY OF *CYPRINUS CARPIO* FINGERLINGS (CYPRINIDAE). *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):129-133. 1982. SFA 28(2)
[State Sci. Res. Inst. Lake River Fish., Kuybyshev Lab., USSR] Water temperature influences cardiac activity of fingerling *Cyprinus carpio*. Temperature influences both rate and volume of cardiac function. The rate of transmission of excitation from the atrium to the ventricle was measured. At varying temperature the hemodynamic effectiveness of the heart and its adaptive reactions are dependent on the biomass of the fish.

83-000676 Dabrowski, K. DIGESTION OF PROTEIN AND AMINO ACID ABSORPTION IN STOMACHLESS FISH, COMMON CARP (*CYPRINUS CARPIO* L.). *Comp. Biochem. Physiol. A Comp. Physiol.* 74(2):409-415. 1983. SFA 28(2)
[Inst. Ichthyobiol., Acad. Agric., 10-957 Olsztyn-Kortowo, Poland]

83-000677 Dannevig, B. H. and K. R. Norum. EFFECTS OF FASTING ON PLASMA LIPIDS AND CHOLESTEROL ESTERIFICATION IN PLASMA, LIVER AND INTESTINAL MUCOSA IN THE CHAR (*SALMO ALPINUS* L.). *Comp. Biochem. Physiol. B Comp. Biochem.* 74(2):243-250. 1983. SFA 28(2)
[Inst. Zoophysiol., P.O. Box 1051, Univ. Oslo, Blindern, Oslo 2, Norway]

83-000678 Davie, P. S.; C. Daxboeck; S. F. Perry and D. J. Randall. GAS TRANSFER IN A SPONTANEOUSLY VENTILATING, BLOOD-PERFUSED TROUT PREPARATION. *J. Exp. Biol.* 101:17-34. Dec. 1982. SFA 28(2)
[Dep. Physiol. Anat., Massey Univ., Palmerston North, New Zealand]

83-000679 Davis, K. B. and N. C. Parker. PLASMA CORTICOSTEROID AND CHLORIDE DYNAMICS IN RAINBOW TROUT, ATLANTIC SALMON, AND LAKE TROUT DURING AND AFTER STRESS. *Aquaculture* 32(1-2):189-194. Apr. 1983. SFA 28(2)

PHYSIOLOGY (CONTINUED)

83-000679 CONTINUED
[Dep. Biol., Memphis State Univ., Memphis, TN 38152] Levels of plasma corticosteroids and chloride were studied in rainbow trout (*Salmo gairdneri*), lake trout (*Salvelinus namaycush*), and Atlantic salmon (*Salmo salar*) after 6 h of confinement in a shallow dipnet. Plasma corticosteroids increased more sharply in rainbow trout than in other species during the confinement, and returned to resting levels more slowly. Plasma chloride levels decreased significantly from resting levels in both rainbow trout and Atlantic salmon confined for 6 h and had not recovered 12 h after release from the dipnet; very little effect was observed in lake trout. Both plasma corticosteroid and chloride dynamics appear to vary widely in closely related species. The differences do not appear to be related to ease of maintaining the species in captivity.

83-000680 Daxboeck, C.; P. S. Davie; S. F. Perry and D. J. Randall. OXYGEN UPTAKE IN A SPONTANEOUSLY VENTILATING, BLOOD-PERFUSED TROUT PREPARATION. *J. Exp. Biol.* 101:35-45. Dec. 1982. SFA 28(2)
[Pac. Gamefish Found., P.O. Box 25115, Honolulu, HI 96825]

83-000681 DeLaney, R. G.; P. Laurent ; R. Galante; A. I. Pack and A. P. Fishman. PULMONARY MECHANORECEPTORS IN THE DIPNOI LUNGFISH *PROTOPTERUS* AND *LEPIDOSIREN*. *Am .J. Physiol.* 244(3):R418-R428. Mar. 1983. SFA 28(2)
[Cardiovascular-Pulmonary Div., Dep. Med., Univ. Pa., Philadelphia 19104]

83-000682 Driedzic, W. R. and J. M. Stewart. MYOGLOBIN CONTENT AND THE ACTIVITIES OF ENZYMES OF ENERGY METABOLISM IN RED AND WHITE FISH HEARTS. *J. Comp. Physiol. B Biochem. Syst. Environ. Physiol.* 149(1):67-73. Nov. 1982. SFA 28(2)
[Dep. Biol., Mount Allison Univ., Sackville, NB E0A 3C0, Canada]

83-000683 Dufour, S.; N. Delerue-Le Belle and Y. Fontaine. DEVELOPMENT OF A HETEROLOGOUS RADIOIMMUNOASSAY FOR EEL (*ANGUILLA ANGUILLA*) GONADOTROPIN. *Gen. Comp. Endocrinol.* 49(3):404-413. Mar. 1983. SFA 28(2)
[Lab. Physiol. Gen. Comp., Mus. Natl. Hist. Nat., Paris Cedex, France]

83-000684 Dunham, R. A.; R. O. Smitherman and C. Webber. RELATIVE TOLERANCE OF CHANNEL X BLUE HYBRID AND CHANNEL CATFISH TO LOW OXYGEN CONCENTRATIONS. *Prog. Fish-Cult.* 45(1):55-57. Jan. 1983. SFA 28(2)
[Dep. Fish Allied Aquacult., Ala. Agric. Exp. Stn., Auburn Univ., Auburn, AL 36849]

83-000685 Emokpae, A. O. and G. E. Anekwe. CHARACTERIZATION OF THE NON-SAPONIFIABLE FRACTION OF THE LIVER LIPIDS OF THE SHARK *CARCHARIAS TAURUS* BY MASS-SPECTROMETRY. *Comp. Biochem. Physiol. B Comp. Biochem.* 74(3):661-665. 1983. SFA 28(2)
[G.E. Anekwe: Dep. Biochem., Coll. Med., Univ. Lagos, Nigeria]

83-000686 Epple, A.; B. Nibbio and M. S. Trachtman. EFFECTS OF EXOGENOUS SOMATOSTATIN AND ANTISOMATOSTATIN ON SERUM PARAMETERS OF THE AMERICAN EEL. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(3):671-675. 1983. SFA 28(2)
[Daniel Baugh Inst. Anat., Thomas Jefferson Univ., 1020 Locust St., Philadelphia, PA 19107]

PHYSIOLOGY (CONTINUED)

83-000687 Evans, D. H.; A. Oikari; G. A. Kormanik and L. Mansberger. OSMOREGULATION BY THE PRENATAL SPINY DOGFISH, *SQUALUS ACANTHIAS*. *J. Exp. Biol.* 101:295-305. Dec. 1982. SFA 28(2)
[Dep. Zool., Univ. Fla., Gainesville 32611]

83-000688 Feathers, M. G. and A. E. Knable. EFFECTS OF DEPRESSURIZATION UPON LARGEMOUTH BASS. *N. Am. J. Fish. Manage.* 3(1):86-90. 1983. SFA 28(2)
[Calif. Polytech. State Univ., San Luis Obispo 93407]

83-000689 Feller, R. DEEP GUTS: A SHALLOW-WATER SOLUTION USING IMMUNOLOGICAL METHODS. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 211-213. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies, Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000690 Fukayama, S. and H. Takahashi. SEX DIFFERENTIATION AND DEVELOPMENT OF THE GONAD IN THE JAPANESE RIVER LAMPREY, *LAMPETRA JAPONICA*. *Bull. Fac. Fish. Hokkaido Univ.* 33(4):206-216. Nov. 1982. SFA 28(2)
[Lab. Fresh-Water Fish-Cult., Fac. Fish., Hokkaido Univ., Japan]

83-000691 Gerking, S. D. and R. M. Lee. THERMAL LIMITS FOR GROWTH AND REPRODUCTION IN THE DESERT PUPFISH *CYPRINODON N. NEVADENSIS*. *Physiol. Zool.* 56(1):1-9. Jan. 1983. SFA 28(2)
[Dep. Zool., Ariz. State Univ., Tempe 85287]

83-000692 Gern, W. A.; C. M. Karn; D. Duvall and E. Wechsler. EXAMINATION OF TROUT RETINAL HYDROXYINDOLE-O-METHYLTRANSFERASE. *J. Colo.-Wyo. Acad. Sci.* 15(1):60. Apr. 1983. Abstract only. SFA 28(2)

83-000693 Gielen, J. T. and M. Terlou. IMMUNOCYTOCHEMICAL EVIDENCE FOR HYPOPHYSIAL PROJECTIONS OF THE CELLS OF THE NUCLEUS LATERALIS TUBERIS *PARS LATERALIS* IN THE RAINBOW TROUT (*SALMO GAIRDNERI*). *Cell Tissue Res.* 228(1):43-50. Jan. 1983. SFA 28(2)
[Zool. Lab., Res. Group Comp. Endocrinol., State Univ. Utrecht, Netherlands]

83-000694 Goncharov, B. F.; A. A. Kuznetzov and E. Burzawa-Gerard. PITUITARY GONADOTROPIC HORMONE FROM A CHONDROSTEAN FISH, STARRED STURGEON (*ACIPENSER STELLATUS* PALL.). IV. DIFFERENCES IN BIOLOGICAL ACTION OF ISOFORMS AND ABSENCE OF SEX-SPECIFIC FORMS. *Gen. Comp. Endocrinol.* 49(3):375-382. Mar. 1983. SFA 28(2)
[N.K. Koltzov Inst. Dev. Biol., USSR Acad. Sci., 26 Vavilov St., Moscow 177 808, USSR]

83-000695 Graham, J. B. THE TRANSITION OF AIR BREATHING IN FISHES. II. EFFECTS OF HYPOXIA ACCLIMATION ON THE BIMODAL GAS EXCHANGE OF *ANCISTRUS CHAGRESI* (LORICARIIDAE). *J. Exp. Biol.* 102:157-173. Jan. 1983. SFA 28(2)
[Physiol. Res. Lab., Scripps Inst. Oceanogr., Univ. Calif., San Diego, La Jolla, CA 92093]

83-000696 Granzier, H. L. M.; J. Wiersma; H. A. Akster and J. W. M. Osse. CONTRACTILE PROPERTIES OF A WHITE- AND A RED-FIBRE TYPE OF THE M. HYOHYOIDEUS OF THE CARP (*CYPRINUS CARPIO* L.). *J. Comp. Physiol. B*

PHYSIOLOGY (CONTINUED)

83-000696 CONTINUED *Biochem. Syst. Environ. Physiol.* 149(4):441-449. Feb. 1983. SFA 28(2)
[Dep. Exp. Anim. Morphol. Cell Biol., Marijkeweg 40, Wageningen, Netherlands]

83-000697 Gray, R. H.; T. L. Page and M. G. Saroglia. BEHAVIORAL RESPONSE OF CARP, *CYPRINUS CARPIO*, AND BLACK BULLHEAD, *ICTALURUS MELAS*, FROM ITALY TO GAS SUPERSATURATED WATER. *Environ. Biol. Fishes* 8(2):163-167. 1 Feb. 1983. SFA 28(2)
[Battelle Pac. Northwest Lab., Richland, WA 99352] A nine chambered circular apparatus (rosette) was used to test the ability of carp (*Cyprinus carpio*) and black bullheaded (*Ictalurus melas*) from Italy, to detect and avoid lethal concentrations of gas supersaturated water. These species are important food fish and are being considered for mass culture in warm water discharges in Italy. Neither species immediately avoided gas supersaturated water. Although the fish eventually avoided extremes of 146% saturation (total gas pressure) after symptoms of gas bubble disease developed, this response did not necessarily preclude mortality. We observed no avoidance to supersaturation levels near the 96h LC_{50}. Thus, avoidance will not protect these species from gass bubble disease mortalities and gas levels in culture facilities should be maintained below hazardous thresholds.

83-000698 Gregory, W. A. ULTRASTRUCTURAL AND HRP STUDIES OF REGIONAL VARIATION AND MATURATION OF NEUROSECRETORY CELLS AND GLIA OF THE GOLDFISH PREOPTIC AREA. *Ph.D. dissertation, Mich. State Univ.* 118p. 1982. From Diss. Abstr. Int. B Sci. Eng. 43(9):2768. Mar. 1983. SFA 28(2)

83-000699 Gruber, K. and W. Wieser. ENERGETICS OF DEVELOPMENT OF THE ALPINE CHARR, *SALVELINUS ALPINUS*, IN RELATION TO TEMPERATURE AND OXYGEN. *J. Comp. Physiol. B Biochem. Syst. Environ. Physiol.* 149(4):485-493. Feb. 1983. SFA 28(2)
[Inst. Zoophysiol., Univ. Innsbruck, A-6020 Innsbruck, Austria]

83-000700 Gulidov, M. V. and K. S. Popova. EGG SURVIVAL, HATCHING DYNAMICS, AND MORPHOLOGICAL PECULIARITIES OF PROLARVAE OF KUTUM, *RUTILUS FRISII KUTUM* (CYPRINIDAE), IN RELATION TO TEMPERATURE. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):81-89. 1982. SFA 28(2)
[IEMEZH, Moscow, USSR] Constant incubation temperatures in the range of 7-22°C showed that the optimum temperature for the embryonic development of this species is 16°C. At higher and lower temperatures, embryo mortality increases, reaching 100% at the extremes of the range; hatching of prolarvae at different temperatures took place at different periods and at different developmental stages.

83-000701 Hails, A. J. TEMPORAL CHANGES IN FAT AND PROTEIN LEVELS IN THE TROPICAL ANABANTID *TRICHOGASTER PECTORALIS* (REGAN). *J. Fish Biol.* 22(2):203-213. Feb. 1983. SFA 28(2)
[Zool. Dep., Univ. Malaya, Lembah Pantai, Kuala Lumpur 22-11, Malaysia]

83-000702 Halpern-Sebold, L. R. and M. P. Schreibman. ONTOGENY OF CENTERS CONTAINING LUTEINIZING HORMONE-RELEASING HORMONE IN THE BRAIN OF PLATYFISH (*XIPHOPHORUS MACULATUS*) AS DETERMINED BY IMMUNOCYTOCHEMISTRY. *Cell Tissue Res.* 229(1):75-84. Jan. 1983. SFA 26(2)
[Dep. Biol., Brooklyn Coll., City Univ. N.Y., Brooklyn, NY]

PHYSIOLOGY (CONTINUED)

83-000703 Hansen, P.; R. F. Addison and D. E. Willis. HEPATIC MICROSOMAL O-DE-ETHYLASES IN COD (*GADUS MORHUA*): THEIR INDUCTION BY AROCLOR 1254 BUT NOT BY AROCLOR 1016. *Comp. Biochem. Physiol. C Comp. Pharmacol. Toxicol.* 74(1):173-175. 1983. SFA 28(2)
[Inst. Water Soil Air Hygiene, Fed. Health Off., Versuchsfeld Marienfelde, Corrensplatz 1, 1000 Berlin 33, West Germany]

83-000704 Hansson, T. and J. Rafter. *IN VITRO* METABOLISM OF ESTRADIOL-17β BY LIVER MICROSOMES FROM JUVENILE RAINBOW TROUT, *SALMO GAIRDNERI*. *Gen. Comp. Endocrinol.* 49(3):490-495. Mar. 1983. SFA 28(2)
[Dep. Zoophysiol., Univ. Gothenburg, Göteborg, Sweden]

83-000705 Hazel, J. R. and N. P. Neas. TURNOVER OF THE FATTY ACYL AND GLYCEROL MOIETIES OF MICROSOMAL MEMBRANE LIPIDS FROM LIVER, GILL AND MUSCLE TISSUE OF THERMALLY ACCLIMATED RAINBOW TROUT, *SALMO GAIRDNERI*. *J. Comp. Physiol. B Biochem. Syst. Environ. Physiol.* 149(1):11-18. Nov. 1982. SFA 28(2)
[Dep. Zool., Ariz. State Univ., Tempe 85287]

83-000706 Heisinger, J. F. and S. M. Dawson. EFFECT OF SELENIUM DEFICIENCY ON LIVER AND BLOOD GLUTATHIONE PEROXIDASE ACTIVITY IN THE BLACK BULLHEAD. *J. Exp. Zool.* 225(2):325-327. Feb. 1983. SFA 28(2)
[Dep. Biol., Univ. S. Dak., Vermillion 57069]

83-000707 Herring, P. J. ASPECTS OF THE BIOLUMINESCENCE OF FISHES. *Oceanogr. Mar. Biol.* 20:415-470. 1982. SFA 28(2)
[Inst. Oceanogr. Stud., Wormley, Godalming, Surrey GU8 5UB, England]

83-000708 Hirji, K. N. and W. A. M. Courtney. NON-SPECIFIC CARBOXYLIC ESTERASE ACTIVITY IN THE DIGESTIVE TRACT OF THE PERCH, *PERCA FLUVIATILIS* L. *J. Fish Biol.* 22(1):1-7. Jan. 1983. SFA 28(2)
[Dep. Zool., Univ. Dar es Salaam, P.O. Box 35064, Dar es Salaam, Tanzania]

83-000709 Holmgren, S. THE EFFECTS OF PUTATIVE NON-ADRENERGIC, NON-CHOLINERGIC AUTONOMIC TRANSMITTERS OF ISOLATED STRIPS FROM THE STOMACH OF THE RAINBOW TROUT, *SALMO GAIRDNERI*. *Comp. Biochem. Physiol. C Comp. Pharmacol. Toxicol.* 74(1):229-238. 1983. SFA 28(2)
[Dep. Zoophysiol., Univ. Göteborg, Box 250 59, S-400 31 Göteborg, Sweden]

83-000710 Ichii, T. and Y. Mugiya. EFFECTS OF A DIETARY DEFICIENCY IN CALCIUM ON GROWTH AND CALCIUM UPTAKE FROM THE AQUATIC ENVIRONMENT IN THE GOLDFISH, *CARASSIUS AURATUS*. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(2):259-262. 1983. SFA 28(2)
[Fac. Fish., Hokkaido Univ., Hakodate 041, Japan]

83-000711 Iga, T. ELECTRIC STIMULATION EXPERIMENTS ON LEUCOPHORES OF A FRESHWATER TELEOST, *ORYZIAS LATIPES*. *Comp. Biochem. Physiol. C Comp. Pharmacol. Toxicol.* 74(1):103-108. 1983. SFA 28(2)
[Dep. Biol., Fac. Sci., Shimane Univ., Matsue 690, Japan]

83-000712 Ince, B. W. EFFECTS OF TEMPERATURE AND DOSE LEVEL ON *IN VIVO* DYNAMICS OF UNLABELLED BOVINE INSULIN IN EELS (*ANGUILLA ANGUILLA* L.). *Gen. Comp. Endocrinol.* 49(2):248-254. Feb. 1983. SFA 28(2)

PHYSIOLOGY (CONTINUED)

83-000712 CONTINUED
[Dep. Biol. Sci., Univ. Aston, Birmingham, Gosta Green, Birmingham B4 7ET, England]

83-000713 Ishimatsu, A. and Y. Itazawa. BLOOD OXYGEN LEVELS AND ACID-BASE STATUS FOLLOWING AIR EXPOSURE IN AN AIR-BREATHING FISH, *CHANNA ARGUS*: THE ROLE OF AIR VENTILATION. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(4):787-793. 1983. SFA 28(2)
[Dep. Fish., Fac. Agric., Kyushu Univ., Hakozaki, Higashi-ku, Fukuoka 812, Japan]

83-000714 Ishimatsu, A. and Y. Itazawa. DIFFERENCE IN BLOOD OSYGEN LEVELS IN THE OUTFLOW VESSELS OF THE HEART OF AN AIR-BREATHING FISH, *CHANNA ARGUS*: DO SEPARATE BLOOD STREAMS EXIST IN A TELEOSTEAN HEART? *J. Comp. Physiol. B Biochem. Syst. Environ. Physiol.* 149(4):435-440. Feb. 1983. SFA 28(2)
[Dep. Fish., Fac. Agric., Kyushu Univ. 4604, Hakozaki, Higashi-ku, Fukuoka 812, Japan]

83-000715 Joern, W. T.; L. G. Gingras and M. Konikoff. PLASMA OSMOLARITY OF SOME FISHES FROM THE UPPER AND LOWER REACHES OF THE VERMILLION RIVER. *Proc. La. Acad. Sci.* 45:190. 1982. Abstract only. SFA 28(2)

83-000716 Johnston, C. E.; T. P. Birt and J. L. Murphy. BRANCHIAL SODIUM-POTASSIUM ATPASE ACTIVITY AND GROWTH OF RAINBOW TROUT IN SEAWATER. *Prog. Fish-Cult.* 45(1):19-23. Jan. 1983. SFA 28(2)
[Dep. Biol., Univ. Prince Edward Island, Charlottetown, PEI CIA 4P3, Canada]

83-000717 Kästner, R. and H. Wolburg. FUNCTIONAL REGENERATION OF THE VISUAL SYSTEM IN TELEOSTS. COMPARATIVE INVETIGATIONS AFTER OPTIC NERVE CRUSH AND DAMAGE OF THE RETINA. *Z. Naturforsch. Sect. C Biosci.* 37(11-12):1274-1280. Nov.-Dec. 1982. SFA 28(2)
[Div. Microscop. Pathol., Inst. Pathol., Liebermeistr. 8, D-7400 Tübingen, West Germany]

83-000718 Kadura, S. N.; S. N. Khrapunov; V. N. Chabanny and G. D. Berdyshev. CHANGES IN CHROMATIN BASIC PROTEINS DURING MALE GAMETOGENESIS OF GRASS CARP. *Comp. Biochem. Physiol. B Comp. Biochem.* 74(2):343-350. 1983. SFA 28(2)
[Dep. Gen. Molec. Genet., Kiev State Univ., Kiev, USSR]

83-000719 Kawamura, T. and S. Yamashita. CHEMICAL SENSITIVITY OF LATERAL LINE ORGANS IN THE GOBY, *GOBIUS GIURINUS*. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(2):253-257. 1983. SFA 28(2)
[Dep. Pharmacol., Kumamoto Univ. Med. Sch., 2-2-1 Honjo, Kumamoto 860, Japan] Summated neural responses to various chemical stimuli were recorded from the peripheral nerve innervating the lateral line organs which occur on the upper snout of the giurine goby, *Gobius giurinus*. the threshold for monovalent chloride salts was estimated to be at around 10^{-3}M, while that for divalent chloride salts, at around 10^{-4}M. The order of the stimulatory effectiveness was RbCl $\geq NH_4Cl \geq$KCl $\geq$NaCl $\geq$LiCl $\geq$CsCl for monovalent salts and $BaCl_2 > CaCl_2 \geq MgCl_2 \geq SrCl_2$ for

PHYSIOLOGY (CONTINUED)

83-000719 CONTINUED divalent salt. Of 17 amino acids only two acidic amino acids, L-Glu and L-Asp, were stimulative and the sensitivity of the lateral line organs to them were considered to be due to the hydrogen ion, since response magnitudes to the amino acids depended upon solution pH and were similar to the response magnitude to HCl of the same pH. Many typical free neuromasts were found to form the so called pit-line on the upper snout region, but were no canal organs were observed.

83-000720 Kawauchi, H.; K. Abe; A. Takahashi; T. Hirano; S. Hasegawa; N. Naito and Y. Nakai. ISOLATION AND PROPERTIES OF CHUM SALMON PROLACTIN. *Gen. Comp. Endocrinol.* 49(3):446-458. Mar. 1983. SFA 28(2)
[Sch. Fish. Sci., Kitasato Univ., Sanriku, Iwate 022-01, Japan]

83-000721 Kimata, M. [CHANGES OF CHEMICAL COMPOSITION DURING EARLY DEVELOPMENT OF EGG AND LARVA IN THE HALF BEAK *HEMIRAMPHUS SAJORI* (TEMMINCK ET SCHLEGEL).] *Bull. Jpn. Soc. Sci. Fish.* 48(11):1663-1671. Nov. 1982. In Japanese with English summ. SFA 28(2)
[Fac. Mar. Sci. Technol., Tokai Univ., Shimizu 424, Japan]

83-000722 Kime, D. E. and M. Hyder. THE EFFECT OF TEMPERATURE AND GONADOTROPIN ON TESTICULAR STEROIDOGENESIS IN *SAROTHERODON (TILAPIA) MOSSAMBICUS IN VITRO*. *Gen. Comp. Endocrinol.* 50(1):105-115. Apr. 1983. SFA 28(2)
[Dep. Zool., University, Sheffield S10 2TN, England]

83-000723 Knable, A. E. and M. G. Feathers. DEVICE FOR EXAMINING THE EFFECTS OF PRESSURE CHANGES ON FISH. *Prog. Fish-Cult.* 45(1):16-18. Jan. 1983. SFA 28(2)
[Calif. Polytech. State Univ., San Luis Obispo 93407]

83-000724 Kobayashi, H.; H. Uemura; Y. Takei; N. Itatsu; M. Ozawa and K. Ichinohe. DRINKING INDUCED BY ANGIOTENSIN II IN FISHES. *Gen. Comp. Endocrinol.* 49(2):295-306. Feb. 1983. SFA 28(2)
[Dep. Biol., Fac. Sci., Toho Univ., Miyama 2-2-1, Funabashi, Chiba 274, Japan]

83-000725 Korenaga, S.; K. Kou and Y. Ito. INDUCTION OF ACTION POTENTIALS IN FISH RED MUSCLE BY DENERVATION. *Proc. R. Soc. Lond. B Biol. Sci.* 217(1206):89-99. 22 Dec. 1982. SFA 28(2)
[Dep. Pharmacol., Fac. Med., Kyushu Univ., Fukuoka 812, Japan]

83-000726 Korsgaard, B.; J. Emmersen and I. Petersen. ESTRADIOL-INDUCED HEPATIC PROTEIN SYNTHESIS AND TRANSAMINASE ACTIVITY IN THE MALE FLOUNDER, *PLATICHTHYS FLESUS* (L.). *Gen. Comp. Endocrinol.* 50(1):11-17. Apr. 1983. SFA 28(2)
[Inst. Biol., Odense Univ., Odense, Denmark]

83-000727 Kostecki, P. T. and J. J. Jones. THE EFFECTS OF OSMOTIC AND ION-OSMOTIC STRESSES ON THE MORTALITY OF RAINBOW TROUT *(SALMO GAIRDNERI)*. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(3):773-775. 1983. SFA 28(2)
[Univ. Mass., Amherst 01003]

PHYSIOLOGY (CONTINUED)

83-000728 Kramer, D. L. AQUATIC SURFACE RESPIRATION IN THE FISHES OF PANAMA: DISTRIBUTION IN RELATION TO RISK OF HYPOXIA. *Environ. Biol. Fishes* 8(1):49-54. 1 Jan. 1983. SFA 28(2)

[Dep. Biol., McGill Univ., 1205 Ave. Docteur Penfield, Montreal, PQ H3A 1B1, Canada] Eighty six species of non-air breathing fish from Panama were tested for aquatic surface respiration (ASR), a behavioral response to extreme hypoxia that involves aquatic respiration at the air-water interface. ASR was well developed in 93% and 72% of species from potentially hypoxic freshwater and marine habitats, respectively, but only 42% of species from consistently well oxygenated marine habitats. This provides evidence that ASR is a specific adaptation to hypoxia and that in fishes of shallow, tropical waters, respiratory responses which maintain oxygen supply are much more widespread than those which eliminate oxygen demand (anaerobic respiration).

83-000729 Kuznetzov, A. A.; B. F. Goncharov and E. Burzawa-Gerard. PITUITARY GONADOTROPIC HORMONE FROM A CHONDROSTEAN FISH, STARRED STURGEON (*ACIPENSER STELLATUS* PALL.). III. POLYMORPHISM. *Gen. Comp. Endocrinol.* 49(3):364-374. Mar. 1983. SFA 28(2)

[N.K. Koltzov Inst. Dev. Biol., USSR Acad. Sci., 26 Vavilov St., Moscow 177 808, USSR]

83-000730 Lacy, E. R. HISTOCHEMICAL AND BIOCHEMICAL STUDIES OF CARBONIC ANHYDRASE ACTIVITY IN THE OPERCULAR EPITHELIUM OF THE EURYHALINE TELEOST, *FUNDULUS HETEROCLITUS*. *Am. J. Anat.* 166(1):19-39. Jan. 1983. SFA 28(2)

[Dep. Anat., Harvard Med. Sch., Boston, MA 02115]

83-000731 Lauder, G. V. NEUROMUSCULAR PATTERNS AND THE ORIGIN OF TROPHIC SPECIALIZATION IN FISHES. *Science* 219(4589):1235-1237. 11 Mar. 1983. SFA 28(2)

[Dep. Anat., Univ. Chicago, 1025 East 57 Street, Chicago, IL 60637] The pattern of muscle electrical activity in the pharyngeal muscles of the mollusc-eating sunfish *Lepomis microlophus* is highly specialized in comparison with the pattern displayed by most other members of the sunfish family and does not change when different prey are eaten. The closest genealogical relative of this species has the specialized muscle activity pattern for crushing prey when it feeds on snales but uses the primitive sequence of muscle activity during swallowing of other prey. The ability of species that crush snales to use molluscan prey effectively is due primarily to the evolutionary transformation of the neuromuscular program controlling the trophic apparatus.

83-000732 Lee, C. and F. Hu. INFLUENCES OF Ca AND Mg IONS ON THE EGG SURVIVAL OF GREY MULLET, *MUGIL CEPHALUS* L. *J. Fish Biol.* 22(1):13-20. Jan. 1983. SFA 28(2)

[Oceanic Inst., Waimanalo, HI] Five kinds of artificial sea water with similar salinity, pH and osmolarity were prepared with different concentrations of calcium and magnesium ions. They were complete sea water, calcium-free sea water, half calcium-free sea water, magnesium-free sea water, and half magnesium-free sea water. The fertilized eggs from induced spawnings of grey mullet *Mugil cephalus*, were transferred to these sea waters at two development states, i.e. before the formation of 2-blastomere stage and at the gastrula stage. Survivals of fertilized egg in different sea waters were checked after several hours incubation, the percentage survival was used as an index of the importance of calcium and magnesium to the embryonic development. the results showed that calcium is indispensable to the embryonic development of mullet egg. Magnesium, however, is not the necessary element in the incuvation medium.

PHYSIOLOGY (CONTINUED)

83-000733 Ley, H. L. III; M. L. Failla and D. S. Cherry. ISOLATION AND CHARACTERIZATION OF HEPATIC METALLOTHIONEIN FROM RAINBOW TROUT (*SALMO GAIRDNERI*). *Comp. Biochem. Physiol. B Comp. Biochem.* 74(3):507-513. 1983. SFA 28(2)
[Dep. Biol., VPI&SU, Blacksburg, VA 24061]

83-000734 Lintlop, S. P. and J. H. Youson. BINDING OF TRIIODOTHYRONINE TO HEPATOCYTE NUCLEI FROM SEA LAMPREYS, *PETROMYZON MARINUS* L., AT VARIOUS STAGES OF THE LIFE CYCLE. *Gen. Comp. Endocrinol.* 49(3):428-436. Mar. 1983. SFA 28(2)
[J.H. Youson: Dep. Zool., Scarborough Coll., Univ. Toronto, West Hill, ON M1C 1A4, Canada]

83-000735 Lintlop, S. P. and J. H. Youson. CONCENTRATION OF TRIIODOTHYRONINE IN THE SERA OF THE SEA LAMPREY, *PETROMYZON MARINUS*, AND THE BROOK LAMPREY, *LAMPETRA LAMOTTENII*, AT VARIOUS PHASES OF THE LIFE CYCLE. *Gen. Comp. Endocrinol.* 49(2):187-194. Feb. 1983. SFA 28(2)
[J.H. Youson: Dep. Zool., Scarborough Coll., Univ. Toronto, West Hill, ON M1C 1A4, Canada]

83-000736 Lowe-Jinde, L. and A. J. Niimi. INFLUENCE OF SAMPLING ON THE INTERPRETATION OF HAEMATOLOGICAL MEASUREMENTS OF RAINBOW TROUT, *SALMO GAIRDNERI*. *Can. J. Zool.* 61(2):396-402. Feb. 1983. In English with French summ. SFA 28(2)
[Dep. Zool., Univ. Guelph, Guelph, ON N1G 2W1, Canada] Haematological parameters of rainbow trout (*Salmo gairdneri*) were examined to determine if the sampling influenced the measurements. The results indicated that haematocrit values of fish anesthetized with tricaine methanesulfonate (TMS or MS 222) sampled after 5-20 min were significantly higher than of fish sampled within 1 min of capture and anesthesia. No differences were observed among haemoglobin content, erythrocyte, and leucocyte counts or their differential cell ratios over the 20-min period. Haemoglobin content and erythrocyte counts increased significantly with size among the three groups examined. It is suggested that differential blood cell ratios could be used as a reliable haematological index because the ratios appear to be independent of the effects of sampling over a short period.

83-000737 MacDonald, D. J. and B. A. McKeown. THE EFFECT OF Ca^{2+} LEVELS ON *IN VITRO* PROLACTIN RELEASE FROM THE ROSTRAL PARS DISTALIS OF COHO SALMON (*ONCORHYNCHUS KISUTCH*). *Can. J. Zool.* 61(3):682-684. Mar. 1983. In English with French summ. SFA 28(2)
[Dep. Biol. Sci., Simon Fraser Univ., Burnaby, BC V5A 1S6, Canada]

83-000738 Mahajan, C. L. and T. R. Dheer. HAEMATOLOGICAL AND HAEMATOPOIETIC RESPONSES TO STARVATION IN AN AIR-BREATHING FISH *CHANNA PUNCTATUS* BLOCH. *J. Fish Biol.* 22(1):111-123. Jan. 1983. SFA 28(2)
[Aquatic Fish Biol. Lab., Dep. Zool., Univ. Rajasthan, Jaipur 302004, India]

83-000739 Mallery, C. H. A CARRIER ENZYME BASIS FOR AMMONIUM EXCRETION IN TELEOST GILL. NH_4+-STIMULATED Na-DEPENDENT ATPASE ACTIVITY IN *OPSANUS BETA*. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(4):889-897. 1983. SFA 28(2)
[Dep. Biol., Univ. Miami, Coral Gables, FL 33124]

PHYSIOLOGY (CONTINUED)

83-000740 Matsuyama, M. and S. Matsuura. [OVARIAN MATURATION AND OVULATION OF THE AMPHIDROMOUS TYPE AYU *PLECOGLOSSUS ALTIVELIS* IN CHIKUGO RIVER BASED ON HISTOLOGICAL OBSERVATIONS.] *Bull. Jpn. Soc. Sci. Fish.* 48(11):1573-1582. Nov. 1982. In Japanese with Engish summ. SFA 28(2)
[Dep. Fish., Fac. Agric., Kyushu Univ., Hakozaki, Higashi, Fukuoka 812, Japan]

83-000741 McDonald, D. G.; R. L. Walker and P. R. H. Wilkes. THE INTERACTION OF ENVIRONMENTAL CALCIUM AND LOW pH ON THE PHYSIOLOGY OF THE RAINBOW TROUT, *SALMO GAIRDNERI*. II. BRANCHIAL IONOREGULATORY MECHANISMS. *J. Exp. Biol.* 102:141-155. Jan. 1983. SFA 28(2)
[Dep. Biol., McMaster Univ., Hamilton, Ontario, L8S 4K1 Canada] Adult rainbow trout, acclimated to external calcium concentrations ranging from 60-5700 µequiv/l, were exposed to pH 4.0-4.1 for 44h. Initially, this exposure provoked massive net losses of sodium and chloride across the gills which arose through a combination of an inhibition of active transport and, more importantly, a stimulation in diffusional efflux. Subsequently, ion losses declined substantially, largely due to a rapid decline in passive efflux but also to a slower, partial recovery in sodium transport. External calcium concentration was virtually without effect on ion fluxes either prior to or following acid exposure but had a definite effect during acid exposure. This effect was initially upon the ratio of Cl^- to Na^+ loss and later upon the degree of inhibition of sodium and chloride transport. Possible mechanisms to explain the complex interactions of calcium and pH are proposed.

83-000742 McDonald, D. G. THE INTERACTION OF ENVIRONMENTAL CALCIUM AND LOW pH ON THE PHYSIOLOGY OF THE RAINBOW TROUT, *SALMO GAIRDNERI*. I. BRANCHIAL AND RENAL NET ION AND H^+ FLUXES. *J. Exp. Biol.* 102:123-140. Jan. 1983. SFA 28(2)
[Dep. Biol., McMaster Univ., Hamilton, ON L8S 4K1, Canada] Exposure of adult rainbow trout to low pH (pH 4.3) in soft water (Ca^{2+} = 223 µequiv/l) caused a substantial ionic disturbance which arose primarily because of large net losses at the gills. In contrast, renal ion losses were low initially and declined even further because of a pronounced reduction in urine flow. A net influx of H^+ occurred across the gills but this was not sufficient to cause a blood acid-base disturbance or a renal response. Although branchial ion and H^+ fluxes declined with time, blood ion levels did not return to normal and many of the fish died. Further reduction in water calcium (Ca^{2+} = 69 µequiv/l) provoked a higher mortality and a more substantial ionic imbalance. These results contrast sharply with the effects on trout of acid exposure in hard water ($Ca^{2+} \geq$ 1600 µequiv/l), where net ion losses and mortality are reduced and H^+ uptake increased. A preliminary model for the interaction of low pH and calcium is proposed and evidence for adaptation to acid stress and for the acid lethality is discussed.

83-000743 Mellinger, J. EGG-CASE DIVERSITY AMONG DOGFISH, *SCYLIORHINUS CANICULA* (L.): A STUDY OF EGG LAYING RATE AND NIDAMENTAL GLAND SECRETORY ACTIVITY. *J. Fish Biol.* 22(1):83-90. Jan. 1983. SFA 28(2)
[Lab. Biol. Anim., Fac. Sci., Univ. Reims, 51100 Reims, France]

83-000744 Menezo, Y.; M. Plouidy and R. Billard. SUR LA COMPOSITION EN ACIDES AMINÉS LIBRES ET PEPTIDIQUES DU LIQUIDE SÉMINAL DE CARPE (*CYPRINUS CARPIO*). [FREE AND PEPTIDIC AMINO-ACID COMPOSITION OF THE CARP (*CYPRINUS CARPIO*) SEMINAL PLASMA.] *C.R. Hebd. Seances Acad. Sci. Ser. III Sci. Vie* 296(1):67-70. 10 Jan. 1983. In French with English summ. SFA 28(2)
[I.N.R.A.-I.N.S.A., Biol., n°406, 69621 Villeurbanne Cedex, France]

PHYSIOLOGY (CONTINUED)

83-000745 Meredith, A. S.; P. S. Davie and M. E. Forster. OXYGEN UPTAKE BY THE SKIN OF THE CANTERBURY MUDFISH, *NEOCHANNA BURROWSIUS*. *N.Z. J. Zool.* 9(3):387-390. 1982. SFA 28(2)
[Dep. Zool., Univ. Canterbury, Christchurch 1, New Zealand] Canterbury mudfish (*Neochanna burrowsius*) were held in small respirometer chambers with rubber dam separating head and body. Oxygen uptake by the head and by the body were determined in water and in air. In both media cutaneus O_2 uptake is a significant component (>43%) of total O_2 consumption (VO_2). In air, more carbon dioxide was lost to the body compartment than to the head compartment. With the head in air and the body in hypoxic water (PO_2 <20 mm hg) there was no loss of O_2 to the water over 2h, and VO_2 was maintained by an increase in O_2 uptake by the head.

83-000746 Metzinger, S. E. and E. G. Ellgaard. EFFECTS OF THE METABOLIC PRODUCT LACTIC ACID ON THE BLUEGILL SUNFISH *LEPOMIS MACROCHIRUS*. *Proc. La. Acad. Sci.* 45:190. 1982. Abstract only. SFA 28(2)

83-000747 Murai, T.; Y. Hirasawa; T. Akiyama and T. Nose. [FREE NINHYDRIN REACTIVE SUBSTANCES IN THE WHITE MUSCLE, DARK MUSCLE, AND LIVER OF CULTURED AND WILD BLUEFIN TUNA JUVENILE *THUNNUS THYNNUS ORIENTALIS*.] *Bull. Jpn. Soc. Sci. Fish* 48(11):1633-1637. Nov. 1982. In Japanese with English summ. SFA 28(2)
[Natl. Res. Inst. Aquacult., Tamaki, Mie 519-04, Japan]

83-000748 Nozaki, M. and A. Gorbman. IMMUNOCYTOCHEMICAL LOCALIZATION OF SOMATOSTATIN AND VASOTOCIN IN THE BRAIN OF THE PACIFIC HAGFISH, *EPTATRETUS STOUTI*. *Cell Tissue Res.* 229(3):541-550. Feb. 1983. SFA 28(2)
[Primate Res. Inst., Kyoto Univ., Inuyama, Aichi 484, Japan]

83-000749 Oduleye, S. O. and D. H. Evans. THE ISOLATED, PERFUSED HEAD OF THE TOADFISH, *OPSANUS BETA*. II. EFFECTS OF VASOACTIVE DRUGS ON UNIDIRECTIONAL WATER FLUX. *J. Comp. Physiol. B Biochem. Syst. Environ. Physiol.* 149(1):115-120. Nov. 1982. SFA 28(2)
[Dep. Biol. Sci., Univ. Ilorin, Ilorin, Nigeria]

83-000750 Ohshima, T.; H. D. Widjaja; S. Wada and C. Koizumi. A COMPARISON BETWEEN CULTURED AND WILD AYU LIPIDS. *Bull. Jpn. Soc. Sci. Fish.* 48(12):1795-1801. Dec. 1982. SFA 28(2)
[Tokyo Univ. Fish., 5-7 Konan-4, Minato, Tokyo 108, Japan]

83-000751 Olivereau, M. and J. Olivereau. RESPONSE OF PROLACTIN CELLS TO ENVIRONMENTAL CALCIUM IN THE EEL (*ANGUILLA ANGUILLA* L.). *Cell Tissue Res.* 229(2):243-252. Feb. 1983. SFA 28(2)
[Lab. Physiol., Inst. Oceanogr., Paris, France]

83-000752 Olivereau, M. and J. Olivereau. KINETICS OF THE RESPONSE OF PROLACTIN CELLS TO ENVIRONMENTAL CHANGES IN THE EEL. *Acta Zool. (Stockh.)* 63(4):239-245. 1982. SFA 28(2)
[Lab. Physiol., Inst. Oceanogr., 195, rue Saint-Jacques, F-75005 Paris, France]

83-000753 Omura, Y. and M. A. Ali. EFFECT OF HYPOPHYSECTOMY ON THE SYNAPTIC RIBBONS IN THE PINEAL ORGAN OF THE KILLIFISH *FUNDULUS HETEROCLITUS*. *Bull. Jpn. Soc. Sci. Fish.* 48(12):1679-1684. Dec. 1982.

PHYSIOLOGY (CONTINUED)

83-000753 CONTINUED SFA 28(2)
[Fish. Lab., Fac. Agric., Nagoya Univ., Chikusa, Nagoya 464, Japan]

83-000754 Ott, J. F. PHYSIOLOGICAL CORRELATES TO BEHAVIORAL CHANGES DURING VESTIBULAR COMPENSATION IN GOLDFISH. *Ph.D. dissertation, Univ. South. Calif.* 1982. From Diss. Abstr. Int. B Sci. Eng. 43(8):2467. Feb. 1983. SFA 28(2)

83-000755 Pals, N.; R. C. Peters and A. A. C. Schoenhage. LOCAL GEO-ELECTRIC FIELDS AT THE BOTTOM OF THE SEA AND THEIR RELEVANCE FOR ELECTROSENSITIVE FISH. *Neth. J. Zool.* 32(4):479-494. Dec. 1982. SFA 28(2)
[Lab. Comp. Physiol., State Univ. Utrecht, Jan van Galenstr. 40, 3572 LA Utrecht, Netherlands] Methods for short-span and wide-span measurements of D.C. electric fields in the sea are described. Local electric fields, uniform for not more than a few metres, were measured by means of short span instruments. Local fields up to 1.5 mV/m occurred very close to the seabed and seemed to be correlated to the presence of clay or mud. Regional electric fields, uniform over a distance of several hundred metres, were measured using wide electrode spans. Regional fields were correlated strongly to the tidal currents. Depending on the velocity and the direction of the water current the regional fields had a strength up to 8 μV/m. The relevance of these electric phenomena for electrosensitive fish is discussed. We hypothesize that local electric fields have a function in spatial orientation, giving information about other environmental factors or providing topographical features.

83-000756 Pandian, T. J. CONTRIBUTIONS TO THE BIOENERGETICS OF A TROPICAL FISH. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 124-131. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies. Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000757 Paxton, R. and B. L. Umminger. ALTERED ACTIVITIES OF BRANCHIAL AND RENAL Na/K- AND Mg-ATPases IN COLD-ACCLIMATED GOLDFISH (*CARASSIUS AURATUS*). *Comp. Biochem. Physiol. B Comp. Biochem.* 74(3):503-506. 1983. SFA 28(2)
[Dep. Biochem., Indiana Univ. Sch. Med., 1100 W. Michigan St., Indianapolis, IN 46223]

83-000758 Perry, S. F.; P. S. Davie; C. Daxboeck and D. J. Randall. A COMPARISON OF CO_2 EXCRETION IN A SPONTANEOUSLY VENTILATING BLOOD-PERFUSED TROUT PREPARATION AND SALINE-PERFUSED GILL PREPARATIONS: CONTRIBUTION OF THE BRANCHIAL EPITHELIUM AND RED BLOOD CELL. *J. Exp. Biol.* 101:47-60. Dec. 1982. SFA 28(2)
[Dep. Zool., Univ. British Columbia, 2354-6270 University Blvd., Vancouver, BC V6T 2A9, Canada]

83-000759 Petersen, I. M.,; O. Sand and B. Korsgaard. A TIME COURSE STUDY OF THE EFFECT OF REPETITIVE DOSES OF ESTRADIOL-17β ON SERUM GLUCOSE AND LIPIDS, LIVER GLYCOGEN AND SOME CARBOHYDRATE METABOLIZING ENZYMES IN LIVER OF MALE FLOUNDER (*PLATICHTHYS FLESUS* L.). *Comp. Biochem. Physiol. B Comp. Biochem.* 74(3):459-466. 1983. SFA 28(2)
[Inst. Biochem., Odense Univ., Campusweg 55, DK-5230 Odense M, Denmark]

PHYSIOLOGY (CONTINUED)

83-000760 Pettersson, K. ADRENERGIC CONTROL OF OXYGEN TRANSFER IN PERFUSED GILLS OF THE COD, *GADUS MORHUA*. *J. Exp. Biol.* 102:327-335. Jan. 1983. SFA 28(2)
[Dep. Zoophysiol., Univ. Göteborg, Göteborg, Sweden]

83-000761 Pickering, A. D. and T. G. Pottinger. SEASONAL AND DIEL CHANGES IN PLASMA CORTISOL LEVELS OF THE BROWN TROUT, *SALMO TRUTTA* L. *Gen. Comp. Endocrinol.* 49(2):232-239. Feb. 1983. SFA 28(2)
[Freshwater Biol. Assoc., Ferry House, Far Sawrey, North Ambleside, Cumbria, LA22 0LP, England]

83-000762 Piomelli, D. and B. Tota. DIFFERENT DISTRIBUTION OF SEROTONIN IN AN ELASMOBRANCH (*SCYLIORHINUS STELLARIS*) AND IN A TELEOST (*CONGER CONGER*) FISH. *Comp. Biochem. Physiol. C Comp. Pharmacol. Toxicol.* 74(1):139-142. 1983. SFA 28(2)
[B. Tota: Inst. Farmacol. Sper., Fac. Farm., via L. Rodinò 22, 80138 Napoli, Italy]

83-000763 Plisetskaya, E.; S. A. Sower and A. Gorbman. THE EFFECT OF INSULIN INSUFFICIENCY ON PLASMA THYROID HORMONES AND SOME METABOLIC CONSTITUENTS IN PACIFIC HAGFISH, *EPTATRETUS STOUTI*. *Gen. Comp. Endocrinol.* 49(2):315-319. Feb. 1983. SFA 28(2)
[Dep. Zool., Univ. Wash., Seattle 98195]

83-000764 Prugh, J. I. P.; C. B. Kimmel and W. K. Metcalfe. NONINVASIVE RECORDING OF THE MAUTHNER NEURONE ACTION POTENTIAL IN LARVAL ZEBRAFISH. *J. Exp. Biol.* 101:83-92. Dec. 1982. SFA 28(2)
[Dep. Biol., Rice Univ., Box 1892, Houston, TX 77001]

83-000765 Rahel, F. J. POPULATION DIFFERENCES IN ACID TOLERANCE BETWEEN YELLOW PERCH, *PERCA FLAVESCENS*, FROM NATURALLY ACIDIC AND ALKALINE LAKES. *Can. J. Zool.* 61(1):147-152. Jan. 1983. In English with French summ. SFA 28(2)
[Lab. Limnol., Univ., Wis., Madison 53706] Yellow perch, *Perca flavescens*, from naturally acidic, Wisconsin brownwater lakes survived longer than perch from alkaline lakes when exposed to a lethal pH in the laboratory. Acclimation to a low but sublethal pH for 3 weeks did not remove the difference in acid tolerance, suggesting it is genetically based. Perch from an acidic, low salinity lake (pH 4.6, 13 µequiv. Na/L, 11µequiv. K/L) had only slightly lower body sodium and potassim levels than perch from a nonacidic, higher salinity lake (pH 7.6, 70µequiv. Na/L, 18µequiv. K/L). Perch from both lake types were equally susceptible to a lethal high pH, indicating that acid tolerance is not merely the result of an overall hardiness, but reflects specific adaptation to low pH. The exceptional low pH tolerance of yellow perch from Wisconsin brownwater lakes rivals that reported for tropical blackwater fishes.

83-000766 Reinking, L. N. ALDOSTERONE RESPONSE TO RENIN, ANGIOTENSIN, ACTH, HEMORRHAGE AND SODIUM DEPLETION IN A FRESHWATER TELEOST, *CATOSTOMUS MACROCHEILUS*. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(4):873-880. 1983. SFA 28(2)
[Dep. Biol., Millersville State Coll., Millersville, PA 17551]

PHYSIOLOGY (CONTINUED)

83-000767 Ritchie, T. C. and R. B. Leonard. IMMUNOHISTOCHEMICAL STUDIES ON THE DISTRIBUTION AND ORIGIN OF CANDIDATE PEPTIDERGIC PRIMARY AFFERENT NEUROTRANSMITTERS IN THE SPINAL CORD OF AN ELASMOBRANCH FISH, THE ATLANTIC STINGRAY (*DASYATIS SABINA*). *J. Comp. Neurol.* 213(4):414-425. 1 Feb. 1983. SFA 28(2)
[Mar. Biomed. Inst., Univ. Tex. Med. Br., Galveston 77550]

83-000768 Roche, H.; J. Jouanneteau and G. Pérès. EFFECTS OF ADAPTATION TO DIFFERENT SALINITIES ON THE LIPIDS OF VARIOUS TISSUES IN SEA DACE (*DICENTRARCHUS LABRAX PISCES*). *Comp. Biochem. Physiol. B Comp. Biochem.* 74(2):325-330. 1983. SFA 28(2)
[Inst. Michel Pacha, Lab. Marit. Physiol. Tamaris Mer, 83500 La Seyne sur Mer, France]

83-000769 Rosenlund, G.; B. Lund; E. Lied and A. von der Decken. PROPERTIES OF WHITE TRUNK MUSCLE FROM SAITHE *POLLACHIUS VIRENS*, RAINBOW TROUT *SALMO GAIRDNERI* AND HERRING *CLUPEA HARENGUS*: PROTEIN SYNTHESIS *IN VITRO*, ELECTROPHORETIC STUDY OF PROTEINS. *Comp. Biochem. Physiol. B Comp. Biochem.* 74(3):389-397. 1983. SFA 28(2)
[Inst. Vitamin Res., Dir. Fish., Bergen, Norway]

83-000770 Russell, I. J. and D. A. Lowe. THE EFFECT OF EFFERENT STIMULATION ON THE PHASE AND AMPLITUDE OF EXTRACELLULAR RECEPTOR POTENTIALS IN THE LATERAL LINE SYSTEM OF THE PERCH (*PERCA FLUVIATILIS*). *J. Exp. Biol.* 102:223-238. Jan. 1983. SFA 28(2)
[Sch. Biol. Sci., Univ. Sussex, Brighton, BN1 9QG, Sussex, England]

83-000771 Schlaghecke, R. BINDING OF ^{125}-J-hCG TO RAINBOW TROUT (*SALMO GAIRDNERI*) TESTIS *IN VITRO*. *Gen. Comp. Endocrinol.* 49(2):261-269. Feb. 1983. SFA 28(2)
[Ruhr-Univ. Bochum, Abt. Biol., AG vergleich. Endokrinol., Gebäude ND 5/27, Universitätsstr. 150, D-4630 Bochum, West Germany]

83-000772 Schrag, J. D. and A. L. DeVries. THE EFFECT OF FREEZING RATE ON THE COOPERATIVITY OF ANTIFREEZE GLYCOPEPTIDES. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(2):381-385. 1983. SFA 28(2)
[Dep. Physiol. Biophys., Univ. Ill., Urbana 61801]

83-000773 Sheridan, M. A. and W. V. Allen. WAX ESTERS IN THE LIVER AND SERUM OF STEELHEAD TROUT *SALMO GAIRDNERI* (RICHARDSON). *Comp. Biochem. Physiol. B Comp. Biochem.* 74(2):251-253. 1983. SFA 28(2)
[Dep. Zool. Cancer Res. Lab., Univ. Calif., Berkeley 94720]

83-000774 Smith, R. L. and D. Rhodes. BODY TEMPERATURE OF THE SALMON SHARK, *LAMNA DITROPIS*. *J. Mar. Biol. Assoc. U.K.* 63(1):243-244. Feb. 1983. SFA 28(2)
[Biol. Prog., Div. Life Sci., Univ. Alaska, Fairbanks]

83-000775 Statova, M. P.; M. G. Talikina and R. A. Kalinich. PHYSIOLOGICAL-CHEMICAL CHARACTERISTICS OF THE EGGS OF COMMON CARP, *CYPRINUS CARPIO* (CYPRINIDAE), UNDER CONDITIONS OF FISH FARMING. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):117-128. 1982. SFA 28(2)
[Inst. Zool. Physiol., Acad. Sci. Moldavian SSR, USSR]

PHYSIOLOGY (CONTINUED)

83-000776 Stratil, A.; P. Bobák; M. Valenta and V. Tomášek. PARTIAL CHARACTERIZATION OF TRANSFERRINS OF SOME SPECIES OF THE FAMILY CYPRINIDAE. *Comp. Biochem. Physiol. B Comp. Biochem.* 74(3):603-610. 1983. SFA 28(2)
[Czech. Acad. Sci., Inst. Anim. Physiol. Genet., 277 21 Liběchov, Czechoslovakia]

83-000777 Sullivan, K. M. ENERGETICS OF THE SABLEFISH, *ANOPLOPOMA FIMBRIA*, UNDER LABORATORY CONDITIONS. *Wash. Sea Grant Prog.* WSG-WO p. 82-2. 106-114. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies. Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 29(2)

83-000778 Takahashi, K.; T. Hirano; K. Takama and K. Zama. MOLECULAR SPECIES OF FISH MUSCLE LECITHIN. *Bull. Jpn. Soc. Sci. Fish.* 48(12):1803-1814. Dec. 1982. SFA 28(2)
[Lab. Food Chem. I, Fac. Fish., Hokkaido Univ., Hokodate, Hokkaido 041, Japan]

83-000779 Talbot, C.; F. B. Eddy and J. Johnston. OSMOREGULATION IN SALMON AND SEA TROUT ALEVINS. *J. Exp. Biol.* 101:61-70. Dec. 1982. SFA 28(2)
[Freshwater Fish. Lab., Pittochry, Perthshire PH16 5LB, Scotland]

83-000780 Thompson, J. and J. Bladwin. LACTATE DEHYDROGENASES OF THE AUSTRALIAN FRESHWATER BLACKFISH *GADOPSIS MARMORATUS* RICHARDSON: IDENTIFICATION OF ISOENZYMES, AND IMMUNOCHEMICAL COMPARISON OF BLACKFISH $LDHM_4$ WITH THE HOMOLOGOUS ENZYME FROM PROPOSED MARINE ANCESTORS. *Comp. Biochem. Physiol. B Comp. Biochem.* 74(2):307-314. 1983. SFA 28(2)
[Dep. Zool., Monash Univ., Clayton, Victoria 3168, Australia]

83-000781 Tisa, M. S.; R. J. Strange and D. C. Peterson. HEMATOLOGY OF STRIPED BASS IN FRESH WATER. *Prog. Fish-Cult.* 45(1):41-44. Jan. 1983. SFA 28(2)
[Dep. Fish. Wildl. Sci., VPI&SU, Blacksburg, VA 24061]

83-000782 Topp, G. PRIMARY LATERAL LINE RESPONSE TO WATER SURFACE WAVES IN THE TOPMINNOW *APLOCHEILUS LINEATUS* (PISCES, CYPRINODONTIDAE). *Pflügers Arch. Eur. J. Physiol.* 397(1):62-67. 1 Apr. 1983. SFA 28(2)
[Inst. Tierphysiol., Wartweg 95, D-6300 Giessen, West Germany]

83-000783 Uematsu, K.; H. Uesugi; S. Murachi and K. Yamamori. CARDIAC ARREST IN THE SPAWNING CHUM SALMON. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(4):899-902. 1983. SFA 28(2)
[Fac. Appl. Biol. Sci., Hiroshima Univ., Fukuyama, Hiroshima 720, Japan] Cardiac activities of male and female spawning chum salmon were recorded simultaneously by using a radio telemetry system in combination with a wired system. Heart beat stopped during a spawning bout for about 10 sec in female and for 4-6 sec in male. Just before and after the temporary cardiac arrest, heart rate increased from the usual rate, about 50 to about 60 beats per min. It is suggested that the cessation of heart beat might be a reflex response of the cardiovascular system to the hypertension at spawning.

PHYSIOLOGY (CONTINUED)

83-000784 Van Den Thillart, G. and R. Verbeek. SUBSTRATES FOR ANAEROBIC CO_2-PRODUCTION BY THE GOLDFISH, *CARASSIUS AURATUS* (L.): DECARBOXYLATION OF ^{14}C-LABELED METABOLITES. *J. Comp. Physiol. B Biochem. Syst. Environ. Physiol.* 149(1):75-81. Nov. 1982. SFA 28(2)
[State Univ. Leiden, Gorlaeus Lab., Dep. Anim. Physiol., P.O. Box 9502, NL-2300 RA Leiden, Netherlands]

83-000785 Van Der Kraak, G.; H. Lin; E. M. Donaldson; H. M. Dye and G. A. Hunter. EFFECTS OF LH-RH AND DES-GLY^{10}[D-ALA^6]LH-RH-ETHYLAMIDE ON PLASMA GONADOTROPIN LEVELS AND OOCYTE MATURATION IN ADULT FEMALE COHO SALMON *(ONCORHYNCHUS KISUTCH). Gen. Comp. Endocrinol.* 49(3):470-476. Mar. 1983. SFA 28(2)
[Dep. Fish. Oceans, 4160 Marine Dr., West Vancouver, BC V7V 1N6, Canada]

83-000786 Van Eys, G. J. J. M.; C. W. G. M. Löwik and S. E. Wendelaar Bonga. ISOLATION OF THE BIOSYNTHETIC PRODUCTS OF THE PAS POSITIVE PARS INTERMEDIA CELLS IN THE CICHLID TELEOST *SAROTHERODON MOSSAMBICUS. Gen. Comp. Endocrinol.* 49(2):277-285. Feb. 1983. SFA 28(2)
[Dep. Zool., Univ. Nijmegen, Toernooiveld 25, 6525 ED Nijmegen, Netherlands]

83-000787 Van Waarde, A.; G. Van Den Thillart and F. Kesbeke. ANAEROBIC ENERGY METABOLISM OF THE EUROPEAN EEL, *ANGUILLA ANGUILLA* L. *J. Comp. Physiol. B Biochem. Syst. Environ. Physiol.* 149(4):469-475. Feb. 1983. SFA 28(2)
[Dep. Anim. Physiol., Gorlaeus Lab., Univ. Leiden, P.O. Box 9502 NL-2300 RA Leiden, Netherlands]

83-000788 Vigh-Teichmann, I.; H.-W. Korf; F. Nürnberger; A. Oksche; B. Vigh and R. Olsson. OPSIN-IMMUNOREACTIVE OUTER SEGMENTS IN THE PINEAL AND PARAPINEAL ORGANS OF THE LAMPREY (*LAMPETRA FLUVIATILIS*), THE EEL (*ANGUILLA ANGUILLA*), AND THE RAINBOW TROUT (*SALMO GAIRDNERI*). *Cell Tissue Res.* 230(2):289-307. Mar. 1983. SFA 28(2)
[2nd Dep. Anat., Semmelweis OTE, Tüzoltó utca 58, H-1094 Budapest, Hungary]

83-000789 Vigh-Teichmann, I.; B. Vigh; M. J. Manzano e Silva and B. Aros. THE PINEAL ORGAN OF *RAJA CLAVATA*: OPSIN IMMUNOREACTIVITY AND ULTRASTRUCTURE. *Cell Tissue Res.* 228(1):139-148. Jan. 1983. SFA 28(2)
[2nd Dep. Anat., Semmelweis OTE Tüzoltó utca 58, H-1094 Budapest, Hungary]

83-000790 Vrona, S. A.; W. A. Gern and B. E. Haley. CHARACTERIZATION OF MELATONIN MEMBRANE RECEPTORS IN TROUT OCULAR TISSUE. *J. Colo.-Wyo. Acad. Sci.* 15(1):59. Apr. 1983. Abstract only. SFA 28(2)

83-000791 Vu, T. T. ETUDE HISTOENZYMOLOGIQUE DES ACTIVITES PROTEASIQUES DANS LE TUBE DIGESTIF DES LARVES ET DES ADULTES DE BAR, *DICENTRARCHUS LABRAX* (L). [A HISTOENZYMOLOGICAL STUDY OF PROTEASE ACTIVITIES IN THE DIGESTIVE TRACT OF LARVAE AND ADULTS OF SEA BASS, *DICENTRARCHUS LABRAX* (L.)] *Aquaculture* 32(1-2):57-69. Apr. 1983. In French with English summ. SFA 28(2)
[Lab. Oceanogr. Biol., 195, rue Saint Jacques, 75005 Paris, France]

PHYSIOLOGY (CONTINUED)

83-000792 Wabuke-Bunoti, M. A. N. and C. E. Firling. THE PREHATCHING DEVELOPMENT OF THE THYROID GLAND OF THE FATHEAD MINNOW, *PIMEPHALES PROMELAS* (RAFINESQUE). *Gen. Comp. Endocrinol.* 49(2):320-331. Feb. 1983. SFA 28(2)
[Dep. Genet. Cell Biol., Univ. Minn., Saint Paul 55108]

83-000793 Weatherley, A. H. and H. S. Gill. RELATIVE GROWTH OF TISSUES AT DIFFERENT SOMATIC GROWTH RATES IN RAINBOW TROUT *SALMO GAIRDNERI* RICHARDSON. *J. Fish Biol.* 22(1):43-60. Jan. 1983. SFA 28(2)
[Life Sci. Div., Scarborough Coll., Univ. Toronto, West Hill, ON M1C 1A4, Canada]

83-000794 Wendelaar Bonga, S. E.; P. I. Lammers and J. C. A. Van Der Meij. EFFECTS OF 1,25- AND 24,25-DIHYDROXYVITAMIN D_3 ON BONE FORMATION IN THE CICHLID TELEOST *SAROTHERODON MOSSAMBICUS*. *Cell Tissue Res.* 228(1):117-126. Jan. 1983. SFA 28(2)
[Univ. Nijmegen, Dept. Zool., Nijmegen, Netherlands]

83-000795 White, A.; T. C. Fletcher and M. B. Pepys. SERUM CONCENTRATIONS OF C-REACTIVE PROTEIN AND SERUM AMYLOID P COMPONENT IN PLAICE (*PLEURONECTES PLATESSA* L.) IN RELATION TO SEASON AND INJECTED LIPOPOLYSACCHARIDE. *Comp. Biochem. Physiol. B Comp. Biochem.* 74(3):453-458. 1983. SFA 28(2)
[NERC Inst. Mar. Biochem., St. Fittick's Rd., Aberdeen AB1 3RA, Scotland]

83-000796 Wiegand, M. D. and D. R. Idler. IMPAIRMENT OF EARLY OVARIAN GROWTH IN LANDLOCKED ATLANTIC SALMON BY AN ANTIBODY TO CARBOHYDRATE-RICH GONADOTROPIN. *Gen. Comp. Endocrinol.* 49(2):210-219. Feb. 1983. SFA 28(2)
[Mar. Sci. Res. Lab., Memorial Univ. Newfoundland, St. John's, NF A1C 5S7, Canada]

83-000797 Wilder, I. B. and J. G. Stanley. RNA-DNA RATIO AS AN INDEX TO GROWTH IN SALMONID FISHES IN THE LABORATORY AND IN STREAMS CONTAMINATED BY CARBARYL. *J. Fish Biol.* 22(2):165-172. Feb. 1983. SFA 28(2)
[Me. Coop. Fish. Res. Unit, Dep. Zool., Univ. Me., Orono 04469]

83-000798 Winkelhake, J. L.; M. J. Vodicnik and J. L. Taylor. INDUCTION IN RAINBOW TROUT OF AN ACUTE PHASE (C-REACTIVE) PROTEIN BY CHEMICALS OF ENVIRONMENTAL CONCERN. *Comp. Biochem. Physiol. C Comp. Pharmacol. Toxicol.* 74(1):55-58. 1983. SFA 28(2)
[Dep. Microbiol. Pharmacol./Toxicol., Med. Coll. Wis., Milwaukee, WI 53226]

83-000799 Wood, C. M.; J. D. Turner and M. S. Graham. WHY DO FISH DIE AFTER SEVERE EXERCISE? *J. Fish Biol.* 22(2):189-201. Feb. 1983. SFA 28(2)
[Dep. Biol., McMaster Univ., Hamilton, ON L8S 4K1, Canada] Trout fitted with dorsal aortic cannulae were subjected to 6 min of intensive exercise and monitored over the following 12h recovery period. Delayed mortality was ≈40%; the majority of deaths occurred 4-8h post-exercise. Surviving fish exhibited a short-lived haemoconcentration reflected in increased haematocrit, haemoglobin, plasma protein, Na+ and Cl- levels; an extended rise in plasma [K+]; a quickly corrected respiratory acidosis; and a more

PHYSIOLOGY (CONTINUED)

83-000799 CONTINUED prolonged metabolic acidosis in concert with a rise in blood lactate. Dying fish exhibited very similar trends except for a significantly greater metabolic acidosis, lower plasma [Cl-], and the apparent accumulation of an unknown anion in the blood prior to death. Cardiac failure did not occur. Blood metabolic acid levels, while elevated, were only ≅50% of peak lactate anion levels and well within the normal range of tolerance, as were all other changes observed in the blood of non-survivors. The hypothesis that post-exercise mortality is due to excessive 'lactic acid' accumulation in the blood is discounted. It is suggested that intracellular acidosis may be the proximate cause of death.

83-000800 Wright, G. M. IMMUNOCYTOCHEMICAL STUDY OF LUTEINIZING HORMONE IN THE PITUITARY OF THE SEA LAMPREY, *PETROMYZON MARINUS* L., DURING ITS UPSTREAM MIGRATION. *Cell Tissue Res.* 230(1):225-228. Mar. 1983. SFA 28(2)
[Dep. Zool., Univ. Toronto, 25 Harbord St., Toronto, ON M5S 1A1, Canada]

GENETICS, VARIATION STUDIES AND HYBRIDIZATION

83-000801 Angus, R. A. GENETIC ANALYSIS OF MELANISTIC SPOTTING IN SAILFIN MOLLIES. *J. Heredity* 74(2):81-84. Mar./Apr. 1983. SFA 28(2)
[Dep. Biol., Univ. Birmingham, Burmingham, AL 35294]

83-000802 Baxhall, P. C. FACTORS AFFECTING LYMPHOCYTE CULTURE FOR CHROMOSOME STUDIES. *J. Fish Biol.* 22(1):61-76. Jan. 1983. SFA 28(2)
[Dep. Life Sci., Trent Polytech., Nottingham NG1 4BU, U.K.]

83-000803 Busack, C. A. and G. A. E. Gall. AN INITIAL DESCRIPTION OF THE QUANTITATIVE GENETICS OF GROWTH AND REPRODUCTION IN THE MOSQUITOFISH, *GAMBUSIA AFFFINIS*. *Aquaculture* 32(1-2):123-140. Apr. 1983. SFA 28(2)
[Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada] Three stocks of mosquitofish were reared under identical conditions through one complete life cycle to quantify phenotypic and genetic variability for traits of growth and reproduction. At 60 days of age females and males averaged 473 mg and 183 mg in weight and 26.2 mm and 20.9 mm in length, respectively. Significant differences were found among stocks for both sexes in both traits. Rearing density strongly affected female size; its effect on male size was much less pronounced. Stage of maturity and male size were closely related, with maturing males being significantly larger than either mature or very immature fish. Heritability estimates for males were 0.25 for both length and weight, for females 0.72 for length and 0.77 for weight. Males averaged 55 days of age at sexual maturity. There were no significant differences among stocks, nor was there a significant effect of density on this trait. Heritability of age at maturity was estimated to be 0.41. Maturation of the first male to mature in a tank appeared to be under much weaker genetic control than maturation of subsequent males, suggesting a genotype-environment interaction. The size of first broods of virgin females averaged 23 fish. Significant differences between stocks for size and first brood were apparent only when female weight was considered. Heritability of brood size was estimated to be 0.16 without correction for female weight, and was impossible to estimate but presumably very low when corrections were made for female weight. Although female weight significantly affected brood size, it accounted for only 13% of the variation in the trait.

GENETICS, VARIATION STUDIES AND HYBRIDIZATION (CONTINUED)

83-000804 Foresti, F.; L. F. Almeida Toledo and S. Pathak. SILVER-STAINED NOR AND SYNAPTONEMAL COMPLEX ANALYSIS DURING MALE MEIOSIS OF *TILAPIA RENDALLI*. *J. Heredity* 74(2):127-128. Mar./Apr. 1983. SFA 28(2)
[Dep. Morfol., Inst. Básico Biol. Med. Agric., UNESP, 18600 Botucatu, Sao Paulo, Brazil]

83-000805 Hartley, S. E. and M. T. Horne. A METHOD FOR OBTAINING MITOTIC FIGURES FROM BLOOD LEUCOCYTE CULTURES OF RAINBOW TROUT, *SALMO GAIRDNERI*. *J. Fish Biol.* 22(1):77-82. Jan. 1983. SFA 28(2)
[Biol. Dep., Univ. Stirling, Stirling FK9 4LA, Scotland]

83-000806 Jensen, G. L.; W. L. Shelton; S. Yang and L. O. Wilken. SEX REVERSAL OF GYNOGENETIC GRASS CARP BY IMPLANTATION OF METHYLTESTOSTERONE. *Trans. Am. Fish. Soc.* 112(1):79-85. Jan. 1983. SFA 28(2)
[Ala. Coop. Fish. Res. Unit, Dep. Fish. Allied Aquacult., Auburn Univ., AL 36849]

83-000807 Kallman, K. D. and V. Brunetti. GENETIC BASIS OF THREE MUTANT COLOR VARIETIES OF *XIPHOPHORUS MACULATUS*: THE GRAY, GOLD AND GHOST PLATYFISH. *Copeia* 1983(1):170-181. 10 Feb. 1983. SFA 28(2)
[Osborn Lab. Mar. Sci., N.Y. Zool. Soc., Brooklyn, NY 11224]

83-000808 Kijima, A. and Y. Fujio. CORRELATION BETWEEN GEOGRAPHIC DISTANCE AND GENETIC DISTANCE IN POPULATIONS OF CHUM SALMON *ONCORHYNCHUS KETA*. *Bull Jpn. Soc. Sci. Fish.* 48(12):1703-1709. Dec. 1982. SFA 28(2)
[Dep. Fish. Sci., Fac. Agric., Tohoku Univ., Sendai 980, Japan] The gene constitution of an individual river population of the chum salmon was compared with that of other river populations by genetic distances calculated from the allelic frequencies at six isozymic loci, *Idh-A2*, *Idh-B2*, *Ldh-A1*, *Mdh-B1*, *Pgm-B2* and *Aat-A1*, which are surveyed by starch gel electrophoresis. A matrix of genetic distances among river populations indicated that an individual river population could not be regarded as a completely genetic isolated population because of exchange of individuals with neighbouring river populations. Anaylsis of a correlation between geographic and genetic distance among river populations revealed three routes of homing migration for spawning. The correlation also revealed that gene constitutions of two river populations separated by more than about 600 km along the homing migration routes could be regarded as practically independent of each other.

83-000809 Kinghorn, B. GENETIC VARIATION IN FOOD CONVERSION EFFICIENCY AND GROWTH IN RAINBOW TROUT. *Aquaculture* 32(1-2):141-155. Apr. 1983. SFA 28(2)
[Dep. Anim. Genet. Breed., Agric. Univ. Norway, Ås-NLH, Norway] The estimation of genetic variation in food conversion efficiency of fish has not previously been undertaken because of difficulty in measuring food consumption on a sufficiently large scale. This problem was overcome by the development of a system to estimate food consumption by consideration of metabolic rate (via oxygen consumption) and the energy component of growth. Two-hundred-and-thirty-one full sib family groups of young rainbow trout were tested using this system over a 2-year period. The family mean heritabilities offood conversion efficiency, growth and food consumption were estimated at 3±10%, 26±12% and 41±13%, respectively. Phenotypic and genetic correlations of family means for these traits were all close to unity. It is concluded that selection for improved food conversion efficiency is of little value.

GENETICS, VARIATION STUDIES AND HYBRIDIZATION (CONTINUED)

83-000810 Okazaki, T. GEOGRAPHICAL DISTRIBUTION OF ALLELIC VARIATIONS OF ENZYMES IN CHUM SALMON *ONCORHYNCHUS KETA*, RIVER POPULATIONS OF JAPAN AND THE EFFECTS OF TRANSPLANTATION. *Bull. Jpn. Soc. Sci. Fish.* 48(11):1525-1535. Nov. 1982. SFA 28(2)
[Far Seas Fish. Res. Lab., 1000 Orido, Shimizu 424, Japan]

83-000811 Philipp, D. P.; W. F. Childers and G. S. Whitt. A BIOCHEMICAL GENETIC EVALUATION OF THE NORTHERN AND FLORIDA SUBSPECIES OF LARGEMOUTH BASS. *Trans. Am. Fish. Soc.* 112(1):1-20. Jan. 1982. SFA 28(2)
[Aquatic Biol. Sect., Ill. Nat. Hist. Surv., Champaign 61820]

83-000812 Richardson, B. J. GEOGRAPHICAL DISTRIBUTION OF ELECTROPHORETICALLY DETECTED PROTEIN VARIATION IN AUSTRALIAN COMMERICAL FISHES. I. JACK MACKEREL, *TRACHURUS DECLIVIS* JENYNS. *Aust. J. Mar. Freshwater Res.* 33(5):917-926. 1982. SFA 28(2)
[Bur. Flora Fauna, Dep. Home Affairs Environ., P.O. Box 1252, Canberra City, A.C.T. 2601, Australia] Eight polymorphic loci were detected in a survey of electrophoretically detectable protein variation, carried out using liver samples from the Australian jack mackerel, *T. declivis*. The distribution of gene and genotype frequencies in sample sets from different areas shows that distinct subpopulations of the species occur in Western Australia and in New Zealand and that two or more geographically overlapping but genetically distinct subpopulations occur in the waters around south-eastern Australia.

83-000813 Richardson, B. J. GEOGRAPHICAL DISTRIBUTION OF ELECTROPHORETICALLY DETECTED PROTEIN VARIATION IN AUSTRALIAN COMMERICAL FISHES. II. JACKASS MORWONG, *CHEILODACTYLUS MACROPTERUS* BLOCH & SCHNEIDER. *Aust. J. Mar. Freshwater Res.* 33(5):927-931. 1982. SFA 28(2)
[Bur. Flora Fauna, Dep. Home Affairs Environ., P.O. Box 1252, Canberra City, A.C.T. 2601, Australia] The presence of genetic polymorphisms in alcohol dehydrogenase, phosphogluconate dehydrogenase (decarboxylating), phosphoglucomutase, adenosine deaminase and glucosephosphate isomerase in the jackass morwong, or tarakihi, and the distribution of the variation in the fish stocks in the waters of south-eastern Australia are described. Although the Australian and New Zealand stocks are genetically distinct, no evidence of population structuring was found in Australian waters.

83-000814 Sezaki, K.; S. Watabe and K. Hashimoto. A COMPARISON OF CHEMICAL COMPOSITION BETWEEN DIPLOIDS AND TRIPLOIDS OF "GINBUNA" *CARASSIUS AURATUS LANGSDORFI*. *Bull. Jpn. Soc. Sci. Fish.* 49(1):97-101. Jan. 1983. SFA 28(2)
[Enoshima Aquarium, Katasekaigna, Fujisawa, Kanagawa 251, Japan]

83-000815 Smith, M. H.; M. W. Smith; S. L. Scott; E. H. Liu and J. C. Jones. RAPID EVOLUTION IN A POST-THERMAL ENVIRONMENT. *Copeia* 1983(1):193-197. 10 Feb. 1983. SFA 28(2)
[Savannah River Ecol. Lab., Drawer E, Aiken, SC 29801]

83-000816 Smith, M. W.; M. H. Smith and R. K. Chesser. BIOCHEMICAL GENETICS OF MOSQUITOFISH. I. ENVIRONMENTAL CORRELATES, AND TEMPORAL AND SPATIAL HETEROGENEITY OF ALLELE FREQUENCIES WITHIN A RIVER DRAINAGE. *Copeia* 1983(1):182-193. 10 Feb. 1983. SFA 28(2)
[Savannah River Ecol. Lab., Drawer E, Aiken, SC 29801]

BEHAVIOR

83-000817 Allen, D. M. and F. W. Munz. VISUAL PIGMENT MIXTURES AND SCOTOPIC SPECTRAL SENSITIVITY IN RAINBOW TROUT. *Environ. Biol. Fishes* 8(3-4):185-190. 1 Mar. 1983. SFA 28(2)

[Coll. Sci. Eng., Univ. Tex. Permian Basin, Odessa 79762] Changes in scotopic visual sensitivity of rainbow trout, *Salmo gairdneri*, were induced by thyroxine and/or temperature treatments. The spectral sensitivities of these fish were correlated directly with changes in the absorption spectrum of a mixture of the two rod visual pigments, rhodopsin and porphyropsin. In contract to earlier reports, these data for trout are more consistent with the hypothesis that labile binary visual pigement mixtures are useful in making short- or long-term adjustments for vision in a variable photic environment.

83-000818 Barila, T. Y.; J. R. Stauffer, Jr. and C. H. Hocutt. TEMPERATURE PREFERENCE AND AVOIDANCE RESPONSE OF THE COMMON SHINER, *NOTROPIS CORNUTUS* (MITCHILL). *Arch. Hydrobiol.* 96(1):112-119. 1982. SFA 28(2)

[Appalachian Environ. Lab., Univ. Md., Cent. Environ. Estuarine Stud., Frostburg State Coll. Campus, Gunter Hall, Frostburg 21532] Acute temperature preference tests using a horizontal thermal gradient were conducted on the common shiner, *Notropis cornutus*, with acclimation temperatures of 6, 12, 18, 24, 30 and 33°C. The calculated final temperature preferendum using the quadratic equation was 22.2°C. Upper avoidance trials were conducted at the same acclimation temperatures. Upper avoidance temperatures of 12, 24, 30, 33 and 36°C were determined for acclimation temperatures of 6, 12, 24, 30 and 33°C, respectively. No significant avoidance was shown at a acclimation temperature of 18°C.

83-000819 Baugh, T. M. SOCIAL BEHAVIOR OF THE SALT CREEK PUPFISH (*CYPRINODON SALINUS* MILLER) IN AQUARIA. *J. Aquaricult.* 2(2):25-28. June 1981. SFA 28(2)

[1020 Custer Ave., Ogden, UT 84404] Seventeen distinct social behaviors are identified for the Salt Creek pupfish (*Cyprinodon salinus*) in aquaria. The behaviors are immobility, patrolling, false charging, charging, bumping, fleeing, freezing, facing, eyeing, circling, whirling, nuzzling, sidling, S-shaping, vibrating, dipping, and digging. These behaviors are compared with those found for the desert pupfish (*Cyprinodon macularius*).

83-000820 Breck, J. E. and M. J. Gitter. EFFECT OF FISH SIZE ON THE REACTIVE DISTANCE OF BLUEGILL (*LEPOMIS MACROCHIRUS*) SUNFISH. *Can. J. Fish. Aquatic Sci.* 40(2):162-167. Feb. 1983. SFA 28(2)

[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830]

83-000821 Brillet, C. COMPORTEMENT AGONISTIQUE DU POISSON AMPHIBIE *PERIOPHTALMUS SOBRINUS* EGGERT. [AGONISTIC BEHAVIOUR IN THE AMPHIBIOUS FISH *PERIOPHTALMUS SOBRINUS* EGGERT.] *Biol. Behav.* 8(1):49-66. 1983. In French with English summ. SFA 28(2)

83-000822 Erckens, W. and W. Martin. EXOGENOUS AND ENDOGENOUS CONTROL OF SWIMMING ACTIVITY IN *ASTYANAX MEXICANUS* (CHARACIDAE, PISCES) BY DIRECT LIGHT RESPONSE AND BY A CIRCADIAN OSCILLATOR. I. ANALYSES OF THE TIME-CONTROL SYSTEMS OF AN EPIGEAN RIVER POPULATION. *Z. Naturforsch. Sect. C Biosci.* 37(11-12):1253-1265. Nov.-Dec. 1982. SFA 28(2)

[Zool. Inst. Univ., Badestr. 9, D-4400 Münster, West Germany]

83-000823 Erckens, W. and W. Martin. EXOGENOUS AND ENDOGENOUS CONTROL OF SWIMMING ACTIVITY IN *ASTYANAX MEXICANUS* (CHARACIDAE, PISCES) BY DIRECT LIGHT RESPONSE AND BY A CIRCADIAN OSCILLATOR. II. FEATURES OF TIME-CONTROLLED

BEHAVIOR (CONTINUED)

83-000823 CONTINUED BEHAVIOUR OF A CAVE POPULATION AND THEIR COMPARISON TO A EPIGEAN ANCESTRAL FORM. *Z. Naturforsch. Sect. C Biosci.* 37(11-12):1266-1273. Nov.-Dec. 1982. SFA 28(2)
[Zool. Inst. Univ., Badestr. 9, D-4400 Münster, West Germany]

83-000824 Ferguson, M. M.; D. L. G. Noakes and D. Romani. RESTRICTED BEHAVIOURAL PLASTICITY OF JUVENILE LAKE CHARR, *SALVELINUS NAMAYCUSH. Environ. Biol. Fishes* 8(2):151-156. 1 Feb. 1983. SFA 28(2)
[Dep. Zool., Univ. Mont., Missoula 59812] Manipulation of water velocity, fish density and food ration produced few significant effects on the behaviour or social system of juvenile lake charr (*Salvelinus namaycush*). Individuals showed consistently low levels of agonistic behaviour and spent more time close to the substrate with increasing water velocity. The restricted behavioural plasticity and potential of this species is constrasted with the much greater range shown by the closely related brook charr (*S. fontinalis*).

83-000825 Fine, M. L. FREQUENCY RESPONSE OF THE SWIMBLADDER OF THE OYSTER TOADFISH. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(3):659-663. 1983. SFA 28(2)
[Dep. Biol., Va. Commonwealth Univ., Richmond, VA 23284] The frequency response of the swimbladder of the oyster toadfish *Opsanus tau* L. was measured with vibration and pressure detectors. There is no evidence of resonance or amplification of acoustic signals by the swimbladder at frequencies audible to the toadfish. The swimbladder does not appear to determine the frequency response of the fish's hearing or of the sounds it produces.

83-000826 Fish, P. A. and J. Savitz. VARIATIONS IN HOME RANGES OF LARGEMOUTH BASS, YELLOW PERCH, BLUEGILLS, AND PUMPKINSEEDS IN AN ILLINOIS LAKE. *Trans. Am. Fish. Soc.* 112(2A):147-153. Mar. 1983. SFA 28(2)
[Biol. Dep., Loyola Univ. Chicago, 6525 N. Sheridan Rd., Chicago, IL 60626]

83-000827 Fricke, H. W. SOCIAL CONTROL OF SEX: FIELD EXPERIMENTS WITH THE ANEMONEFISH *AMPHIPRION BICINCTUS. J. Comp. Ethol.* 61(1):71-77. Jan. 1983. SFA 28(2)
[Max-Planck-Inst. Verhaltensphysiol., D-8131 Seewiesen, West Germany]

83-000828 Garman, G. Ç. OBSERVATIONS ON JUVENILE RED HAKE ASSOCIATED WITH SEA SCALLOPS IN FRENCHMAN BAY, MAINE. *Trans. Am. Fish. Soc.* 112(2A):212-215. Mar. 1983. SFA 28(2)
[Me. Coop. Fish. Res. Unit, Dep. Zool., Univ. Me., Orono 04469]

83-000829 Goudie, C. A.; K. B. Davis and B. A. Simco. INFLUENCE OF THE EYES AND PINEAL GLAND ON LOCOMOTOR ACTIVITY PATTERNS OF CHANNEL CATFISH *ICTALURUS PUNCTATUS. Physiol. Zool.* 56(1):10-17. Jan. 1983. SFA 28(2)
[Ecol. Res. Cent., Dep. Biol., Memphis State Univ., Memphis, TN 38152]

83-000830 Haraldstad, Ø. and B. Jonsson. AGE AND SEX SEGREGATION IN HABITAT UTILIZATION BY BROWN TROUT IN A NORWEGIAN LAKE. *Trans. Am. Fish. Soc.* 112(1):27-37. Jan. 1983. SFA 28(2)
[Zool. Inst., Univ. Oslo, P.O. Box 1050, Blindern, N-Oslo 3, Norway]

BEHAVIOR (CONTINUED)

83-000831 Holt, S. A.; C. L. Kitting and C. R. Arnold. DISTRIBUTION OF YOUNG RED DRUMS AMONG DIFFERENT SEA-GRASS MEADOWS. *Trans. Am. Fish. Soc.* 112(2B):267-271. Mar. 1983. SFA 28(2)
[Univ. Tex. Port Aransas Mar. Lab., Port Aransas 78373]

83-000832 Inoue, M.; W. G. Ning and T. Arimoto. [UPSTREAM MOVEMENT OF FRESHWATER FISHES UNDER BRIGHT AND DARK CONDITIONS.] *Bull. Jpn. Soc. Sci. Fish.* 48(12):1697-1701. Dec. 1982. In Japanese with English summ. SFA 28(2)
[Tokyo Univ. Fish., Konan, Minato, Tokyo 108, Japan] The rheotaxis of fish generally has been understood to depend on the mechanical receptors like the lateral line and cutaneous sensations and, since Lyon's report in 1904, the function of visual sense has been strongly emphasized. In this study the upstreaming reaction of freshwater fishes was examined under bright and dark conditions, with a rotating water trough devoid of visual objects. Behaviour of eight species of freshwater fishes in the current (17.4 cm/s) were compared under three different grades of illumination (4.0, 0.15 and 0.10 Lux) in the darkened laboratory. The results of the experiments are as follows; Under bright condition (4.0 Lux) fish in the current without visual objects showed a weak upstream movement, whereas under dark conditions (0.15 and 0.10 Lux) a vigorous upstream movement was shown. It seemed to be attributed to the compensational reaction by the mechanical receptors which allowed the fish to react positively against the current, without the visual objects under dark conditions. Other experiments at night and in turbid water also were conducted for comparison with the results of observations in the daytime. These data then are consistent with the view on the upstream movement of fish mentioned above.

83-000833 Jenkins, R. L. OBSERVATIONS ON THE COMMENSAL RELATIONSHIP OF *NOMEUS GRONOVII* WITH *PHYSALIA PHYSALIS*. *Copeia* 1983(1):250-252. 10 Feb. 1983. SFA 28(2)
[Natl. Aquarium, Pier 3, 501 E. Pratt St., Baltimore, MD 21202]

83-000834 Jones, K. A. EFFECTS OF TEMPERATURE ON THE ACTIVITY AND ORIENTATION OF GOLDFISH *(CARASSIUS AURATUS)*. *Comp. Biochem. Physiol. A Comp. Physiol.* 74(3):777-780. 1983. SFA 28(2)
[Freshwater Inst., 501 University Crescent, Winnipeg, MB R3T 2N6, Canada]

83-000835 Kasyanov, A. N.; Y. G. Izyumov and V. N. Yakovlev. [MORPHOLOGICAL VARIATION AND INTRASPECIFIC STRUCTURE OF THE ROACH *RUTILUS RUTILUS* (CYPRINIFORMES, CYPRINIDAE) FROM THE VOLGA BASIN WATER BODIES.] *Zool. Zh.* 61(12):1826-1836. 1982. In Russian with English summ. SFA 28(2)
[Inst. Biol. Inland Waters, USSR Acad. Sci., Borok, USSR]

83-000836 Kawamura, G. and T. Shimowada. [DISCRIMINATION OF STRIPED SHAPE BY JAPANESE PARROTFISH.] *Bull. Jpn. Soc. Sci. Fish.* 49(1):55-60. Jan. 1983. In Japanese with English summ. SFA 28(2)
[Lab. Fish. Technol., Fac. Fish., Kagoshima Univ., 4-50-20 Shimoarata, Kagoshima 890, Japan] This study was conducted to examine the ability of Japanese parrot fish *Oplegnathus fasciatus* (Temminck and Schlegel) to discrimiate their vertically striped body coloration which could be a visual signal for intraspecific communication. The fish were trained to discriminate a shape which resembles Japanese parrotfish in countour and strip coloration. After the training, transfer tests were run. The fish were not able to discriminate between shapes having five and seven vertical stripes. The difference between the two shapes employed was the presence of the 6th and 7th vertical stripes in the caudal area. The fish trained on the square shape having vertical stripes or horzontal stripes gave no evidence of having learned to discriminate the exact number of stripes on each nor of

BEHAVIOR (CONTINUED)

83-000836 CONTINUED having developed the higher ability to discriminate vertical stripes from horzontal ones. The ability of the fish to discriminate striped shapes by photopic vision was the same as that by scotopic vision AT 0.01-0.03 1x. From the results obtained, it was concluded that their body coloration can be an intraspecific visual signal but the 6th and 7th vertical stripes might not be important for their social communication.

83-000837 Kramer, D. L.; D. Manley and R. Bourgeois. THE EFFECT OF RESPIRATORY MODE AND OXYGEN CONCENTRATION ON THE RISK OF AERIAL PREDATION IN FISHES. *Can. J. Zool.* 61(3):653-665. Mar. 1983. In English with French summ. SFA 28(2)

[Dep. Biol., McGill Univ., 1205 Ave. Docteur Penfield, Montreal, PQ H3A 1B1, Canada]

83-000838 Lenanton, R. C. J. ALTERNATIVE NON-ESTUARINE NURSERY HABITATS FOR SOME COMMERCIALLY AND RECREATIONALLY IMPORTANT FISH SPECIES OF SOUTH-WESTERN AUSTRALIA. *Aust. J. Mar. Freshwater Res.* 33(5):881-900. 1982. SFA 28(2)

[West. Aust. Mar. Res. Lab., P.O. Box 20, North Beach, W.A. 6020, Australia] The distribution and relative abundance of the 0+ year classes of 16 commercially and recreationally important fish species from the inshore marine and estuarine waters of south-western Australia were investigated. The results of this study, together with data obtained from an investigation of the way in which juvenile fish used the Blackwood River estuary (Lenanton 1977), revealed that only three of these species in this region could be exclusively regarded as estuarine-dependent: two of the species entered the estuary for the entire year and the third was a seasonal migrant. The remaining 13 species all made use of at least 30% of the inshore marine environment sampled during the study, which was equivalent to the total area of nursery habitat available in the Blackwood River estuary. The main conclusion of this study is that for these species, the inshore marine environments of south-western Australia provide otherwise unavailable alternative nursery areas to those traditionally found in estuaries.

83-000839 Mansfield, P. J.; D. J. Jude; D. T. Michaud; D. C. Brazo and J. Gulvas. DISTRIBUTION AND ABUNDANCE OF LARVAL BURBOT AND DEEPWATER SCULPIN IN LAKE MICHIGAN. *Trans. Am. Fish. Soc.* 112(2A):162-172. Mar. 1983. SFA 28(2)

[Great Lakes Res. Div., Inst. Sci. Technol., Univ. Mich., Ann Arbor 48109]

83-000840 McCormick, F. H. and N. Aspinwall. HABITAT SELECTION IN THREE SPECIES OF DARTERS. *Environ. Biol. Fishes* 8(3-4):279-282. 1 Mar. 1983. SFA 28(2)

[Dep. Biol., St. Louis Univ., St. Louis, MO 63103]

83-000841 McFarland, W. N. and E. R. Loew. WAVE PRODUCED CHANGES IN UNDERWATER LIGHT AND THEIR RELATIONS TO VISION. *Environ. Biol. Fishes* 8(3-4):173-184. 1 Mar. 1983. SFA 28(2)

[Sect. Ecol. Syst., Div. Biol. Sci., Cornell Univ., Ithaca, NY 14853-0239] Maximal visual sensitivity of most vertebrates and invertebrates coincides with the dominant wave-induced flicker frequencies associated with underwater light. Waves also produce patterns off reflective objects that resemble many of the body markings found on fishes. The close relationship that exists between the physiological properties of spatial and temporal vision thus suggests an ancient adaptation to the wave-induced fluctuations and spatial patterns associated with underwater light.

BEHAVIOR (CONTINUED)

83-000842 Moody, R. C.; J. M. Helland and R. A. Stein. ESCAPE TACTICS USED BY BLUEGILLS AND FATHEAD MINNOWS TO AVOID PREDATION BY TIGER MUSKELLUNGE. *Environ. Biol. Fishes* 8(1):61-65. 1 Jan. 1983. SFA 28(2)

[Dep. Zool., Ohio State Univ., Columbus 43210] To explain why esocids prefer cylindrical, soft-rayed prey over compressed, spiny-rayed prey, we quantified behavioral interaction between tiger muskellunge (F_1 hybrid of male northern pike *Esox lucius* and female muskellunge *E. masquinongy*) and fathead minnows (*Pimephales promelas*) and bluegills (*Lepomis macrochirus*). Tiger muskellunge required four times as many strikes and longer pursuits to capture bluegills than fathead minnows. Tiger muskellunge attacked each prey species differently; fathead minnows were grasped at midbody and bluegills were attacked in the caudal area. Each prey species exhibited different escape tactics. Fathead minnows remained in open water and consistently schooled; bluegills dispersed throughout the tank and sought cover by moving to corners and edges. Due to their antipredatory behavior (dispersing, cover seeking, and remaining motionless) and morphology (deep body and spines), bluegills were less susceptible to capture by tiger muskellunge than were fathead minnows.

83-000843 Pals, N.; P. Valentijn and D. Verwey. ORIENTATION REACTIONS OF THE DOGFISH, *SCYLIORHINUS CANICULA*, TO LOCAL ELECTRIC FIELDS. *Neth. J. Zool.* 32(4):495-512. Dec. 1982. SFA 28(2)

[Lab. Comp. Physiol., State Univ. Utrecht, Jan van Galenstr. 40, 3572 LA Utrecht, Netherlands] The purpose of the experiment reported in this paper was to find out whether the electrosensitive elasmobranchs use local geo-electric fields for their spatial orientation. Since local electric fields occur only very close to the seabed we used a typically bottom-living elasmobranch as a test subject, the dogfish *Scyliorhinus canicula*. In our introductory experiments dogfish were found to react spontaneously to food-correlated olfactory stimuli and to light/shade patterns. These parameters were then used in conditioning experiments, which indicated that dogfish are capable of compass orientaiton in an electric field. Our dogfish showed the same prey-catching reactions to small electric dipoles as reported by Kalmijn (1971). We found different reactions, however, in dogfish of different lengths. The small animals showed more avoidance reactions and less bite reactions than the larger ones. Dogfish were kept in total darkness in an experimental tank with a large dipole field along one of the walls. When the same electric field pattern was applied in the middle of the tank some of the dogfish reacted to the dipole as if there was a wall. We conclude from our experiments that nocturnal short-range migrations of the dogfish are guided to some degree by local electric fields. It is not certain whether dogfish use local or regional electric fields during long-range migrations but our results indicate that they are capable of doing so.

83-000844 Popper, A. N. and R. G. Northcutt. STRUCTURE AND INNERVATION OF THE INNER EAR OF THE BOWFIN, *AMIA CALVA*. *J. Comp. Neurol.* 213(3):279-286. 20 Jan. 1983. SFA 28(2)

[Dep. Anat., Georgetown Univ., Sch. Med. Dent., Washington, DC 20007]

83-000845 Purcell, L. J. and J. B. Shrode. VERTICAL TEMPERATURE PREFERENCE TANK FOR LARVAL AND JUVENILE FISH. *Prog. Fish-Cult.* 45(1):27-29. Jan. 1983 SFA 28(2)

[Dep. Biol., Occidental Coll., Los Angeles, CA 90041]

83-000846 Rowland, W. J. INTERSPECIFIC AGGRESSION AND DOMINANCE IN *GASTEROSTEUS*. *Environ. Biol. Fishes* 8(3-4):269-277. 1 Mar. 1983. SFA 28(2)

[Dep. Biol., Indiana Univ., Bloomington, IN]

BEHAVIOR (CONTINUED)

83-000847 Scherer, E. and B. Van Der Veen. AN ULTRASONIC BEAM ACTOGRAPH FOR LABORATORY AND FIELD USE. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1137. iv + 15p. Dec. 1982. In English with French summ. SFA 28(2)
[Dep. Fish. Oceans, Winnipeg, MB R3T 2N6, Canada]

83-000848 Teyssedre, C. and P. Moller. THE OPTOMOTOR RESPONSE IN WEAK-ELECTRIC MORMYRID FISH: CAN THEY SEE? *J. Comp. Ethol.* 60(4):306-312. Dec. 1982. SFA 28(2)
[Lab. Physiol. Nerv., Dep. Neurophysiol. Sens., C.N.R.S., Gif-sur-Yvette, France]

83-000849 Webb, P. W. SPEED, ACCELERATION AND MANOEUVRABILITY OF TWO TELEOST FISHES. *J. Exp. Biol.* 102:115-122. Jan. 1983. SFA 28(2)
[Sch. Nat. Resour., Univ. Mich., Ann Arbor 48109] Speed, acceleration rate and turning radius were measured for rainbow trout (*Salmo gairdneri*; length 25.7 cm) and smallmouth bass (*Micropterus dolomieui*; length 23.6 cm) attacking live minnows. The observations sampled a range of values for each kinematic variable up to the limits of maximum performance. Minimum turning radius was independent of speed and acceleration rate. Expressed as a ratio of total length, L, minimum radii were 0.18±0.2L for trout and 0.11±0.02L for bass ($\bar{X}$±2s.e.). Differences in minimum turning radius, R, between trout and bass were attributed to differences in the volume of the body and entrained water, V, and projected lateral surface area of the body and median fins, A. For subcarangiform swimmers, the dimensionless minimum specific turning radius R/L + 2V/AL. Since V is numerically equal to the mass of the body, M, and added water mass (approximately 0.2M) for neutrally buoyant fish, R/L can be calculated from two easily measured morphological parameters, M and A.

LIFE HISTORY-GENERAL WORKS

83-000850 Blaber, S. J. M. THE ECOLOGY OF *SPHYRAENA BARRACUDA* (OSTEICHTHYES: PERCIFORMES) IN THE KOSI SYSTEM WITH NOTES ON THE SPHYRAENIDAE OF OTHER NATAL ESTUARIES. *S. Afr. J. Zool.* 17(4):171-176. 1982. SFA 28(2)
[Dep. Zool., Univ. Natal, Pietermaritzburg, South Africa] The ecology of *Sphyraena barracuda* was studied in the Kosi estuary system of Natal. Fry enter from the sea at a length of 20 mm and live in shallow marginal weed-beds until a length of 80 mm when they move to fringing *Phragmites* reed-bed. After reaching 300 mm they move to open water areas. No specimens longer than 500 mm were recorded and none were mature. Growth is rapid, they attain 180 mm in the first six months and after two years measure 400-500 mm. They leave the estuary after about two years. Their significance in the estuarine fish community is due to their predation, at all sizes, on a variety of estuarine-dependent juvenile fishes (e.g. *Rhabdosargus* spp., Mugilidae) and adults of estuarine species (e.g. *Ambassis* spp.). *S. barracuda* was recorded at salinities between 4°/oo and 35°/oo, only in very clear water and at temperatures from 14.4°C to 37°C. *Sphyraena bleekeri* and *S. genie*, which are also clear-water species, were found at Kosi in salinities from 0.5 to 35°/oo. They are also piscivorous on a range of small teleosts. *Sphyraena jello* is the most widespread barracuda in Natal estuaries, but only juveniles were recorded. This species is tolerant of a wide range of tubidities and salinities which enables it to live under most estuarine conditions. The distribution, ecology and interspecific interactions among Sphyraenidae in Natal estuaries are discussed in relation to their feeding biology, habitat preferenda and physical tolerances.

LIFE HISTORY-GENERAL WORKS (CONTINUED)

83-000851 Blaber, S. J. M. and D. P. Cyrus. THE BIOLOGY OF CARANGIDAE (TELEOSTEI) IN NATAL ESTUARIES. *J. Fish Biol.* 22(2):173-188. Feb. 1983. SFA 28(2)

[Zool. Dep., Univ. Natal, Pietermaritzburg, Natal, 3200, South Africa] The occurrence and abundance of 17 species of Carangidae in Natal estuaries are described. The following six species are of significance in the estuarine community: *Caranx ignobilis, C. melampygus, C. papuensis, C. sexfasciatus, Lichia amia* and *Scomberoides lysan*. Only juveniles and subadults utilize estuaries. The time of recruitment, growth rates and feeding biology of six species were investigated. Among the juveniles, *C. ignobilis* and *C. sexfasciatus* are mainly piscivorous on a variety of small estuarine fishes and estuarine dependent juveniles of marine species, while *C. melampygus, C. papuensis* and *S. lysan* filter feed on mysids and juvenile penaeids. Subadults of all species are piscivorous, although *C. papuensis* and *S. lysan* retain a suitable gill raker structure for filter feeding and a proportion of their diet consists of mysids and penaeids. The salinity and turbidity preferences of each species were investigated. All are euryhaline but *C. melampygus, C. papuensis* and *S. lysan* are only found in clear water. It is suggested that the more widespread estuarine distribution of juvenile *C. sexfasciatus* and *C. ignobilis* may be related to their turbidity tolerances. The role of carangids in Natal estuaries is discussed in relation to their ecological significance in estuaries as predators and their degree of estuarine dependence.

83-000852 Burns, T. THE GIANTS OF GERRARD. *Wildl. Rev.* 10(4):21-24. 1982-1983. SFA 28(2)

83-000853 Centro de Investigaciones Pesqueras. LUTIANIDOS. *Cent. Invest. Pesq. Bol. Bibliogr.* No. 6. 46p. June 1982. SFA 28(2)

[C. Habana, Cuba]

83-000854 Chávez, H. MARCADO DE ROBALO PRIETO, *CENTROPOMUS POEYI*, EN LA CUENCA DEL PAPALOAPAN. [TAGGING OF "ROBALO PRIETO", *CENTROPOMUS POEYI*, IN THE PAPALOAPAN RIVER BASIN.] *Cienc. Pesq.* 1(1):17-26. 1981. In Spanish with English summ. SFA 28(2)

[CICIMAR, Inst. Polit. Nacl., La Paz, Baja California Sur, Mexico]

83-000855 Corbett, B. and P. M. Powles. SPAWNING AND EARLY-LIFE ECOLOGICAL PHASES OF THE WHITE SUCKER IN JACK LAKE, ONTARIO. *Trans. Am. Fish. Soc.* 112(2B):308-313. Mar. 1983. SFA 28(2)

[Biol. Dep., Trent Univ., Peterborough, ON K9J 7B8, Canada]

83-000856 DeMartini, E. E.; T. O. Moore and K. M. Plummer. REPRODUCTIVE AND GROWTH DYNAMICS OF *HYPERPROSOPON ARGETEUM* (EMBIOTOCIDAE) NEAR SAN DIEGO, CALIFORNIA. *Environ. Biol. Fishes* 8(1):29-38. 1 Jan. 1983. SFA 28(2)

[Mar. Sci. Inst., Univ. Calif., Santa Barbara 93106] Nearly all male and about 60% of the female *Hyperprosopon argenteum* from the waters near San Diego, California attained sexual maturity as age group 0 fish. Males matured during fall at 65-95 mm standard length; females matured at ~90mm during late fall. Females produced broods averaging nine embryos during early April-early June after a 5-6 month gestation period. Brood size was proportional to female size, and was better correlated with weight than with length of female. Larger, age group I and older females became pregnant earlier in the year than smaller, age group 0 females. Males and females grew at equally fast rates during the spring and summer prior to sexual maturity. The growth rate of both sexes thereafter decelerated equally until age 12

LIFE HISTORY-GENERAL WORKS (CONTINUED)

83-000856 CONTINUED months; and growth of males was slower than that of females among age I + fish. By age II, females had attained longer mean body lengths (130 mm) and heavier mean body weights (66 g) than similarly aged males (120 mm and 52 g). Larger maximum female body sizes resulted both from their faster growth during their second year and their greater average longevity. Differences between male and female growth rates and survivorships are related to growth and survivorship within other geographic populations of *H. argenteum*. Sexual differences in the life history of *H. argenteum* in general resemble the patterns of maturation, growth, and survivorship with other Embiotocidae.

83-000857 Diana, J. S. GROWTH, MATURATION, AND PRODUCTION OF NORTHERN PIKE IN THREE MICHIGAN LAKES. *Trans. Am. Fish. Soc.* 112(1):38-46. Jan. 1983. SFA 28(2)
[Sch. Nat. Resour., Univ. Mich., Ann Arbor 48109]

83-000858 Ercolini, A.; R. Berti; L. Chelazzi and G. Messana. RESEARCHES ON THE PHREATOBIC FISHES OF SOMALIA: ACHIEVEMENTS AND PROSPECTS. *Monit. Zool. It.* 17(Suppl.):219-241. 1982. In English with Italian summ. SFA 28(2)
[Ist. Zool., Univ. Firenze, Firenze, Italy]

83-000859 Golani, D. THE BIOLOGY OF THE SQUIRRELFISH *ADIORYX RUBER* (FORSSKÅL, 1775) IN THE MEDITERRANEAN WITH MERISTIC COMPARISON TO THE RED SEA POPULATION. *Isr. J. Zool.* 31(1-2):67-68. 1982. Abstract only. SFA 28(2)
[Dep. Zool., Hebrew Univ. Jerusalem, Jerusalem 91904, Israel]

83-000860 Haug, T. and B. Gulliksen. SIZE, AGE, OCCURRENCE, GROWTH, AND FOOD OF GREENLAND HALIBUT, *REINHARDTIUS HIPPOGLOSSOIDES* (WALBAUM) IN COASTAL WATERS OF WESTERN SPITZBERGEN. *Sarsia* 67(4):293-297. 1982. SFA 28(2)
[Dep. Mar. Biol., Tromsö Mus., Univ. Tromsö, P.O. Box 2550, N-9001 Tromsö, Norway] The fishes were caught at depths below 300 m and were from 9 to 58 cm long. They belonged to six year classes (I-VI), but most of them were from one to four years old. Western Spitzbergen waters thus seem to be a nursery ground for this species. The average yearly increment in length was nearly 8 cm. The polar cod, *Boreogadus saida* (Lepechin), was the most important food item for the investigated juvenile Greenland halibut.

83-000861 Kallemeyn, L. STATUS OF THE PALLID STURGEON *SCAPHIRHYNCHUS ALBUS*. *Fisheries (Bull. Am. Fish. Soc.)* 8(1):3-9. Jan.-Feb. 1983. SFA 28(2)
[Natl. Park Serv., Voyageurs Natl. Park, MN] Information presented concerning the pallid sturgeon, *Scaphirhynchus albus*, was compiled from published and unpublished papers, from personal communications with numerous biologists, and from the results of a survey of 45 agencies and individuals. Pallid sturgeon occur in the Missouri River and the lower half of the Mississippi River and certain of their tributaries. Of the 250 pallids that were reported, approximately 76% were collected from the Missouri River in Montana and the Dakotas. Because of the rarity of this species, information on its life history is limited. Regression equations were developed for the length-weight relationships of pallids from two Missouri River reservoirs. The apparent rarity of the pallid sturgeon and the lack of knowledge concerning it has prompted 9 of the 13 states within its range to classify it

LIFE HISTORY-GENERAL WORKS (CONTINUED)

83-000861 CONTINUED as either threatened or endangered or to give it some other special recognition. The Endangered Spcies Committee of the American Fisheries Society has also classified it as threatened throughout its range. Additional information is needed on its habitat requirements if it is to be protected from habitat destruction or modification.

83-000862 Kwain, W. DOWNSTREAM MIGRATION, POPULATION SIZE, AND FEEDING OF JUVENILE RAINBOW TROUT. *J. Great Lakes Res.* 9(1):52-59. 1983. SFA 28(2)

[Ontario Minist. Nat. Resour., 875 Queen St. East, Sault Ste. Marie, ON P6A 2B3, Canada] Emigration of juvenile rainbow trout (*Salmo gairdneri*) from a tributary of Lake Superior was associated with receding water levels and rising water temperatures (peaking in mid-June). According to 1973 and 1979 estimates, about 23,000 juvenile rainbow trout inhabited the creek each year. Eleven major taxa of benthic organisms were collected in 1972, of which 88% were Diptera and Trichoptera. From a total of 136 stomaches examined, general agreement was found between benthos in the creek and food taxa utilized by the fish. However, the smaller fish (<7 cm) fed more on benthic organisms than terrestrial insects, while the larger fish (>14 cm) consumed more terrestrial insects than benthos.

83-000863 Luer, C. A. BREEDING, EMBRYONIC DEVELOPMENT AND EARLY GROWTH OF THE CLEAR-NOSED SKATE (*RAJA EGLANTERIA*) IN CAPTIVITY. *Fla. Sci.* 46(Suppl. 1):19-20. 1983. Abstract only. SFA 28(2)

[Mote Mar. Lab., 1600 City Island park, Sarasota, FL 33577] In our laboratory, adult clear-nosed skates have been bred successfully, eggs have been harvested, embryonic stages have been described, and the initial year's growth has been closely monitored on the newborn animals. Eggs are laid in pairs, the time interval between the appearance of successive egg pairs varying from 2-10 days. Laying continues for several weeks to the extent that a single female is capable of producing 20-30 pairs of eggs. Development within the egg case lasts about 13 weeks. Monthly measurements of total length, disc width, and body weight have been obtained on approximately 50 hatchlings. By 9 months of age, the young skates average around 50% of the size dimensions and about 15% of the body weight of sexually mature specimens. Due to their relative ease of handling and maintenance, and their ability to breed and produce offspring in captivity, the clear-nosed skate may prove to be a useful laboratory animal model for numerous research applications.

83-000864 Maynard, S. D. ASPECTS OF THE BIOLOGY OF MESOPELAGIC FISHES OF THE GENUS *CYCLOTHONE* (PISCES: GONOSTOMATIDAE) IN HAWAIIAN WATERS. *Ph.D. dissertation, Univ. Hawaii* 272p. 1982. From Diss. Abstr. Inst. B Sci. Eng. 43(9):2770. Mar. 1983. SFA 28(2)

Seven species of the abundant mesopelagic genus *Cyclothone* (Pisces: Gonostomatidae) occur off Hawaii; *C. alba*, *C. pseudopallida*, and *C. paliida* comprise more than 98% of the genus' standing stock which averages 318 fishes and 31 g (wet weight)/100m^2 of ocean surface. Larvae develop in epipelagic waters. Adults of these three species do not undertake diel vertical migrations and occupy slightly overlapping depth ranges between 425 and 1,350 m. The *Cyclothone* stock appears to be in equilibrium; no temporal pattern was found in the course of two years' sampling for length-frequency distribution, standing stock, and gonad development. Copepods and ostracods constitute the most common prey. The feeding rate appears remarkably low and shows no diel periodicity. Adult otolith growth increments present a paradox--neither a daily nor an annual periodicity seems consistent with other life history aspects. Sexual dimorphism includes smaller, macrosmatic males which are less numerous than females, but no evidence of protandry was found. Both sexes have large reproductive investments. These characteristics seem to be adaptations to a life of lethargy and concealment which allow *Cyclothone* to maintain their numerical superiority over other midwater fishes.

LIFE HISTORY-GENERAL WORKS (CONTINUED)

83-000865 McBride, D. N. and S. L. Marshall. FEASIBILITY OF SCALE PATTERN ANALYSIS TO IDENTIFY THE ORIGINS OF CHINOOK SALMON (*ONCORHYNCHUS TSHAWYTSCHA* WALBAUM) IN THE LOWER YUKON RIVER COMMERCIAL GILLNET FISHERY, 1980-1981. *Alaska Dep. Fish Game Inf. Leafl.* No. 208. vi + 64p. Jan. 1983. SFA 28(2)

[Alaska Dep. Fish Game, Div. Commer. Fish., Anchorage] During 1980 and 1981, the feasibility of using scale patterns to identify major component stocks of chinook salmon (*Oncorhynchus tshawytscha* Walbaum) in the Yukon River commercial chinook salmon fishery was investigated. For both years, scale samples and sex and size data were collected from both the District 1 commercial catch and major spawning tributaries throughout the Yukon River drainage. Samples of known origin were pooled into three broad geographic regions for analysis; the lower, middle, and upper Yukon runs. Nearest neighbor classification models of scale measurements were used to determine the origin of age 1.3 and 1.4 fish in the District 1 commercial catch. The District 1 harvest was composed mostly of age 1.4 and 1.3 fish during both 1980 (47.5% and 47.4%, respectively) and 1981 (76.3% and 18.1%, respectively). Pooled age composition estimates for the lower, middle, and upper Yukon runs were found to be significantly different during both 1980 1981. Nearest neighbor classification accuracies were considered marginally acceptable and varied from .582 to .932. Point estimates for the contribution of age 1.3 fish indicate that upper Yukon fish predominated the catch during both 1980 (57.6%) and 1981 (59.0%). Point estimates for the composition of age 1.4 fish indicate that middle Yukon fish predominated the catch during both 1980 (70.6%) and 1981 (77.7%). For both age classes combined, fish of Alaskan origin (i.e. lower and middle Yukon runs) accounted for 56.6% of the 1980 catch and 70.7% of the 1981 catch.

83-000866 Minami, T. [THE EARLY LIFE HISTORY OF A FLOUNDER *PARALICHTHYS OLIVACEUS.*] *Bull. Jpn. Soc. Sci. Fish.* 48(11):1581-1588. Nov. 1982. In Japanese with English summ. SFA 28(2)

[Dep. Fish., Fac. Agric., Kyoto Univ., Kyoto 606, Japan] The early life history of a flounder *Paralichthys olivaceus* (Temminck et Schlegel) was studied in the western Wakasa Bay, the Japan Sea. General morphology and characteristics of the larvae and juvenile ranging from 3.25 mm to 13.20 mm BL, were described. The characteristic features of this fish in early larval stages were elongations of the first 5 dorsal fin rays and distribution patterns of melanophores on the body surface. There is some variation in relationship between stage and body length in larvae, especially at the late metamorphosis stage. It may mean the variation in the size at settlement. Judging from records of occurrence of early larvae, actual spawning may occur in the western Wakasa Bay during a relative long period from March to May. Early postlarvae were caught mainly off the coast of Wakasa Bay, and late postlarvae were caught mainly in the nearshore regions. In the period of pelagic larval stage, an inshore movement must have taken place. Early juveniles were captured in the shallower water of the estuary of Yura River, and this area may be their nursery ground. Annual occurrence of larvae were surveyed by means of underwater fish lamp, and it appeared that the number and period of larval occurrence showed remarkable differences from year to year. Analyses of the gut content showed that the food items were copepod nauplii in early postlarvae, *Oikopleura* spp. in the late postlarvae, and copepods and mysids in early juveniles. Some considerations on the daily food intake of the larvae under natural conditions were discussed.

83-000867 Nottage, A. S. and E. J. Perkins. THE BIOLOGY OF SOLENETTE, *BUGLOSSIDIUM LUTEUM* (RISSO), IN THE SOLWAY FIRTH. *J. Fish Biol.* 22(1):21-27. Jan. 1983. SFA 28(2)

[Univ. Strathclyde, Dep. Biol., Mar. Lab., The Fort, Kilcreggan, Helensburgh, Dunbartonshire G84 0JQ, U.K.] The population of solenette, *Buglossidium luteum*, in the Solway Firth was studied from November 1977 until January 1979. The fish live in mobile, highly aggregated groupings, on sandy bottoms, in the outer Firth. A general offshore movement occurs in winter with a limited incursion of juveniles into the inner Solway in summer.

LIFE HISTORY-GENERAL WORKS (CONTINUED)

83-000867 CONTINUED Most growth occurs in the first few years of life and a length of 130 mm is attained. Longevity is 10 years. Females grow larger than males, but both sexes mature in their third year. Spawning starts in March/April, is most active in May/June and ends in August. Food intake is markedly reduced in winter. Small crustacea, bivalve molluscs and polychaete worms form year-round components of a varied diet. Juvenile forms, especially shrimp and fish are readily taken when available.

83-000868 Riddell, D. J. EARLY LIFE HISTORY OF CAPTIVE-REARED *GOBIOMORPHUS BASALIS* (OSTEICHTHYES: ELEOTRIDAE). *Tane* 28:207-211. 1982. SFA 28(2)

[Gordonton Rd., R.D. 1, Taupiri, New Zealand] A method of rearing Cran's bully (*Gobiomorphus basalis*) in captivity is outlined. The development of this species throughout the first four weeks after hatching is described, with illustrations. Cran's bully is seen to be more advanced at hatching than related species, though the rapid development observed may be due to artificial factors such as the temperature at which the aquarium was kept and the ready availability of food.

83-000869 Shershnev, A. P.; V. M. Chupakhin and V. A. Rudnev. ECOLOGY OF JUVENILE PINK SALMON, *ONCORHYNCHUS GORBUSCHA* (SALMONIDAE), FROM SAKHALIN AND ITURUP ISLANDS DURING THE MARINE PERIOD OF LIFE. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):90-97. 1982. SFA 28(2)

[Pac. Fish. Oceanogr. Res. Inst., Yuzhno-Sakhalinsk, USSR] Data are presented on the abundance of juvenile pink salmon, *Oncorhynchus gorbuscha*, in the sea near the coasts of the Sakhalin and Iturup Islands. Biological characteristics of the juveniles and some information on their marine environment are presented. Stomach content and food composition were analyzed. Some differences in the behavior and feeding of pink salmon and autumn chum, *O. keta*, juveniles during the coastal period of life are discussed.

83-000870 Shute, P. W.; D. G. Lindquist and J. R. Shute. BREEDING BEHAVIOR AND EARLY LIFE HISTORY OF THE WACCAMAW KILLIFISH, *FUNDULUS WACCAMENSIS*. *Environ. Biol. Fishes* 8(3-4):293-300. 1 Mar. 1983. SFA 28(2)

[D. G. Lindquist: Dep. Biol., Univ. N. C., Wilmington 28406] The territorial, courtship and spawning behavior of *Fundulus waccamensis* was investigated in the field and laboratory. Spawning occurs from April to August. Sexual dimorphism is manifested through dichromatism, genitalia, morphometric differences and contact structures. In nature, nuptial males vigorously defend circular territories and court entering females by circling them, sidling, 'J' shaping and spawning in the sand substrate. In the aquarium, males perform eight advertisement motor patterns during courtship, of which dipping and flashing are most frequent. The female is relatively inactive, performing only two basic acts. The maximum number of mature eggs per ovary is 120. Both mature egg numbers and total egg numbers are highly correlated with standard length. Recently fertilized eggs are colorless and adhesive. The newly hatched young is well developed and relatively large in size.

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC.

83-000871 Allen, M. J. FUNCTIONAL STRUCTURE OF SOFT-BOTTOM FISH COMMUNITIES OF THE SOUTHERN CALIFORNIA SHELF. *Ph.D. dissertation, Univ. Calif. (San Diego)* 603p. 1982. From Diss. Abstr. Int. B Sci. Eng. 43(8):2434. Feb. 1983. SFA 28(2)

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC. (CONTINUED)

83-000872 Aro, E. and V. Sjöblom. STOCK ASSESSMENT OF FLOUNDER OFF THE COAST OF FINLAND IN 1975-81. *Int. Counc. Explor. Sea* C.M. 1982/J:25. 15p. 1982. In English with French summ. SFA 28(2)
[Finn. Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

83-000873 Aro, E. and V. Sjöblom. THE ABUNDANCE OF 0-GROUP AND 1-YEAR-OLD FLOUNDER OFF THE COAST OF FINLAND IN 1978-81 ACCORDING TO EXPLORATORY FISHING WITH A BEACH SEINE. *Int. Counc. Explor. Sea* C.M.1982/J:26. 8p. 1982. In English with French summ. SFA 28(2)
[Finn. Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

83-000874 Aro, E. and V. Sjöblom. THE ABUNDANCE OF BALTIC HERRING AND SPRAT ACCORDING TO ECHO COUNTING IN THE SEAS AROUND FINLAND IN 1981. *Int. Counc. Explor. Sea* C.M. 1982/J:20. 13p. 1982. In English with French summ. SFA 28(2)
[Finn. Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

83-000875 Aro, E.; V. Sjöblom and R. Hudd. THE ABUNDANCE OF 0-GROUP BALTIC HERRING OFF THE COAST OF FINLAND IN 1979-81 ACCORDING TO EXPLORATORY FISHING WITH ISAACS-KIDD MID-WATER TRAWL. *Int. Counc. Explor. Sea* C.M. 1982/J:18. 10p. 1982. In English with French summ. SFA 28(2)
[Finn. Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

83-000876 Carrier, J. C. NURSE SHARKS OF BIG PINE KEY: POPULATION DYNAMICS AND GROWTH RATES. *Fla. Sci.* 46(Suppl. 1):19. 1983. Abstract only. SFA 28(2)
[Dep. Biol., Albion Coll., Albion, MI 49224] Of 61 nurse sharks (*Ginglymostoma cirratum*) tagged and released from Big Pine Key (Florida Keys), 12 different animals have been recaptured (19.7%). Animals taken in the study averaged 124.4 cm in length and 10.1 kg in weight, with approximately equal numbers of males and females. The average interval between initial capture and recapture was 260 days with average changes in length of 14.1 cm/year and average changes in weight of 5.0 kg/yr. Length/weight histograms prepared from the data provide an equation for in-field approximation of weight from length measurements of y=0.198x-13.3 (y=weight; x=length; correlation coefficient 'r' = 0.930). The use and comparative success of 3 types of external tags is summarized and evaluated, and preliminary results of ultrasonic telemetric tracking are presented.

83-000877 Davidoff, E. B. POPULATION DYNAMICS OF THE CYPRINID *MIROGREX TERRAESANCTAE TERRAESANCTAE* (STEINITZ, 1952) IN LAKE KINNERET, ISRAEL. *Bamidgeh* 34(4):130-139. Dec. 1982. SFA 28(2)
[Lake Kinneret Fish. Res. Lab., Dist. Fish. Off., P.O. Box 33, Tiberias, Israel]

83-000878 Doi, T.; D. Mendizabal and M. Contreras. ANALISIS PRELIMINAR DE LA POBLACION DE MERO, *EPINEPHELUS MORIO* (VALENCIENNES) EN EL BANCO DE CAMPECHE. [PRELIMINARY ANALYSIS OF THE POPULATION OF "MERO", *EPINEPHELUS MORIO* (VALENCIENNES) ON THE CAMPECHE BANK.] *Cienc. Pesq.* 1(1):1-15. 1981. In Spanish with English summ. SFA 28(2)
[Tokai Reg. Fish. Res. Lab., Tokai, Japan]

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC. (CONTINUED)

83-000879 Eggers, D. M.; C. P. Meacham and H. Yuen. SYNOPSIS AND CRITIQUE OF THE AVAILABLE FORECASTS OF SOCKEYE SALMON RETURNING TO BRISTOL BAY IN 1983. *Alaska Dep. Fish Game Inf. Leafl.* No. 207. iii + 24p. Jan. 1983. SFA 28(2)
[Alaska Dep. Fish Game, Juneau 99802]

83-000880 Fréchet, A.; J. J. Dodson and H. Powles. LES PARASITES DE l'ÉPERLAN D'AMÉRIQUE (*OSMERUS MORDAX*) ANADROME DU QUÉBEC ET LEUR UTILITÉ COMME ÉTIQUETTES BIOLOGIQUES. [THE PARASITES OF AMERICAN SMELT (*OSMERUS MORDAX*) ANADROMOUS IN QUEBEC USED AS BIOLOGICAL TAGS.] *Can. J. Zool.* 61(3):621-626. Mar. 1983. In French with English summ. SFA 28(2)
[Dep. Fish. Oceans, Dir. Rech., C.P. 15500, 901 Cap Diamant, PQ G1K 7Y7, Canada]

83-000881 Gibson, R. N. RECENT STUDIES ON THE BIOLOGY OF INTERTIDAL FISHES. *Oceanogr. Mar. Biol.* 20:363-414. 1982. SFA 28(2)
[Dunstaffnage Mar. Res. Lab., Oban, Argyll, Scotland]

83-000882 Haymes, G. T.; W. E. Dunford and G. L. Vascotto. CHANGES IN ABUNDANCE AND GROWTH CHARACTERISTICS OF WHITE PERCH FROM THE MOUTH OF THE BAY OF QUINTE. *J. Great Lakes Res.* 8(4):614-618. 1982. SFA 28(2)
[Ontario Hydro, Res. Div., 800 Kipling Ave., KD140 Toronto, Ontario M8Z 5S4, Canada] White perch became established in Lake Ontario in the 1950s and by the mid 1960s were a major commercial species in the Bay of Quinte area. Commercial catches have fluctuated markedly, ranging from approximately 60,000 to 230,000 kg/yr between 1964 and 1978. Experimental trap nets set inshore of the mouth of the Bay of Quinte during May to July suggest a decline in white perch abundance from 1973 through 1978. However, the commercial catch did not similarly decline until 1979 when the commercial catch fell to a low of 30,000 kg/yr. The reason for this difference may be due to the fact that the bulk of the commercial catch is harvested during the winter when white perch congregate at the mouth of the bay, making fishing relatively productive. The growth of white perch was also considered, based on back-calculated growth curves of white perch caught in the experimental nets. Lee's phenomenon--a tendency for back-calculated lengths at a given age to become progressively smaller as the age of the fish from which there were computed increases--was apparent among the fish caught during this study although lacking in an earlier study. Due to the size selective nature of the fishery, an increased commercial harvest in recent years may have removed a disproportionate number of faster growing individuals from the population.

83-000883 Ikonen, E. and H. Auvinen. RESULTS OF STOCKING WITH BALTIC SALMON IN FINLAND IN 1969-1980. *Int. Counc. Explor. Sea* C.M. 1982/M:38. 19p. 1982. In English with French summ. SFA 28(2)
[Finn. Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

83-000884 Lasiak, T. A. RECRUITMENT AND GROWTH PATTERNS OF JUVENILE MARINE TELEOSTS CAUGHT AT KING'S BEACH, ALGOA BAY. *S. Afr. J. Zool.* 18(1):25-30. 1983. In English with Afrikaans summ. SFA 28(2)
[Dep. Zool., Univ. Transkei, P.B. X5092, Umtata, Republic of Transkei] The recruitment patterns of six teleosts were studied at King's Beach, Algoa Bay. February to May marked the major recruitment period for *Diplodus sargus*, *Lithognathus mormyrus*, *Rhabdosargus globiceps* and *Trachurus capensis*. The major recruitment of *Sarpa salpa* fry took place between August and September. *Pomadasys olivaceum* fry of < 5 cm total length were caught

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC. (CONTINUED)

83-000884 CONTINUED throughout the year indicating an extended breeding period. The estimated growth rates of new recruits between February and May (autumn/winter) was 0.60 cm month^{-1} for *L. mormyrus*, 0.75 cm month^{-1} for *R. globiceps* and 0.40 cm month^{-1} for *T. capensis*. The empirical growth curve derived for *S. salpa* indicated a growth rate of 0.75 cm month^{-1}. No growth estimates could be made for *P. olivaceum* or *D. sargus*.

83-000885 Neves, R. J. and G. B. Pardue. ABUNDANCE AND PRODUCTION OF FISHES IN A SMALL APPALACHIAN STREAM. *Trans. Am. Fish. Soc.* 112(1):21-26. Jan. 1983. SFA 28(2)
[Va. Coop. Fish. Res. Unit, VPI&SU, Blacksburg 24061]

83-000886 Olvera Limas, R. M. ESTIMACION DE BIOMASA REPRODUCTORA DE *SARDINOPS SAGAX CAERULEA*, EN LA COSTA ORIENTAL DEL GOLFO DE CALIFORNIA. ENERO 1976. [ESTIMATION OF SPAWNING BIOMASS OF *SARDINOPS SAGAX CAERULEA*, ON THE EAST COAST OF THE GULF OF CALIFORNIA. 1976.] *Cienc. Pesq.* 1(1):27-34. 1981. In Spanish with English summ. SFA 28(2)
[Dep. Pesca, Dir. Gen. Inst. Nacl. Pesca, Mexico, D.F.]

83-000887 Padilla García, M. A. BIOMASA DE SARDINA (*SARDINOPS SAGAX*) Y MERLUZA (*MERLUCCIUS PRODUCTUS*). FEBRERO, 1977. [BIOMASS OF SARDINE (*SARDINOPS SAGAX*) AND HAKE (*MERLUCCIUS PRODUCTUS*). FEBRUARY, 1977.] *Cienc. Pesq.* 1(1):35-43. 1981. In Spanish with English summ. SFA 28(2)
[Dep. Pesca, Dir. Gen. Inst. Nacl. Pesca, Mexico, D.F.]

83-000888 Parmanne, R. and V. Sjöblom. ABUNDANCE OF SPRAT EGGS AND LARVAE IN THE NORTHERN BLATIC IN 1981. *Int. Counc. Explor. Sea* C.M. 1982/J:22. 8p. 1982. In English with French summ. SFA 28(2)
[Finn. Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland

83-000889 Parmanne, R. and V. Sjöblom. THE ABUNDANCE OF SPRING SPAWNING BALTIC HERRING LARVAE IN THE SEAS AROUND FINLAND IN 1981 AND THE EFFECT OF ZOOPLANKTON ABUNDANCE ON THE HERRING YEAR CLASS STRENGTH. *Int. Counc. Explor. Sea* C.M. 1982/J:17. 14p. 1982. In English with French summ. SFA 28(2)
[Finn. Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

83-000890 Perry, W. G. FINFISH STANDING CROPS BEFORE WATER CONTROL STRUCTURE OPERATION, SABINE NATIONAL WILDLIFE REFUGE. *Proc. La. Acad. Sci.* 45:190. 1982. Abstract only. SFA 28(2)
This paper reports status of ongoing standing crop estimates of finfish at 4 stations of the Sabine National Wildlife Refuge. Samples were collected annualy since 1979 in an effort to support more detailed analysis by the Louisiana Cooperative Fishery Unit of how the aquatic resources will be least affected by placement of water control structures on the east end of the Refuge. Annual standing crop estimates collected before the structures were fully operational have been extremely variable. The Shallow North Bayou station estimates ranged from 5.6 to 17.8 kg/ha; whereas, samples from the deeper Beach canal ranged from 5.6 to 485.5 kg/ha.

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC. (CONTINUED)

83-000891 Shimazaki, K. and K. Kyushin. [ON THE POPULATION OF THE YOUNG JAPAN SEA GREENLING, *PLEUROGRAMMUS AZONUS* JORDAN ET METZ, IN THE OKHOTSK SEA.] *Bull. Fac. Fish. Hokkaido Univ.* 33(4):229-239. Nov. 1982. In Japanese with English summ. SFA 28(2)

[Res. Inst. North Pac. Fish, Fac. Fish., Hokkaido Univ., Japan] During the periods from early August to mid-September in 1973-1976, biological and oceanographic investigations were carried out in the Okhotsk Sea to study the pelagic fish community by use of a research gill net. A large number of the young Japan Sea greenling, *Pleurogrammus azonus*, was collected from stations between latitudes 48°N and 54°N; the fishes were densely distributed in the southern study area near Hokkaido. The frequency distribution of body lengths was almost normal and the mean length ranged from 19.4 cm in 1973 to 17.3 cm in 1976. All fishes obtained were determined to be yearlings on the basis of the scale method of age determination and based on previous studies on the age and growth of the species. Sex ratios were homogeneous within the sampling area for each year, and the ratios of female to male in the samples were estimated to be nearly equal except in 1974. In 1974 females exceeded males in number; the 95% confidence interval of the ratio of females was 53.7-63.7%. the contenst of the stomachs were analyzed in order to determine the feeding habits of the young. The fishes fed mostly on copepods, amphipods and euphausids. The numbers of vertebrae were examined as one of the meristic characteristics. Significant differences in vertebral averages were recognized between year-classes. Temperature and salinity were observed in order to better understand the environmental conditions of the fish. A marked thermocline was found in water about 10-30 m in depth; cold saline water of less than 1°C was below it, warm surface water of more than 12°C above it. Connections of the young Japan Sea greenling with the immature fish caught by Danish seine in the Okhotsk Sea off Hokkaido and with the native spawning ground of the young are discussed.

83-000892 Toivonen, J. and E. Jutila. REPORT ON PARR POPULATION DENSITIES TAGGING EXPERIMENTS AND RIVER CATCHES OF THE SALMON STOCK OF THE RIVER SIMOJOKI IN 1972-1980. *Int. Counc. Explor. Sea* C.M. 1982/M:40. 16p. 1982. In English with French summ. SFA 28(2)

[Finn. Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

83-000893 Waters, T. F. REPLACEMENT OF BROOK TROUT BY BROWN TROUT OVER 15 YEARS IN A MINNESOTA STREAM: PRODUCTION AND ABUNDANCE. *Trans. Am. Fish. Soc.* 112(2A):137-146. Mar. 1983. SFA 28(2)

[Dep. Entomol. Fish. Wildl., Univ. Minn., St. Paul 55108]

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC.

83-000894 Asahina, K. and I. Hanyu. ROLE OF TEMPERATURE AND PHOTOPERIOD IN ANNUAL REPRODUCTIVE CYCLE OF THE ROSE BITTERLING *RHODEUS OCELLATUS OCELLATUS*. *Bull. Jpn. Soc. Sci. Fish.* 49(1):61-67. Jan. 1983. SFA 28(2)

[Coll. Agric. Vet. Med., Nihon Univ., Setagaya, Tokyo 154, Japan] The rose bitterling (*Rhodeus ocellatus ocellatus*, Cyprinidae), a spring and summer breeder, was exposed to various temperature and photoperiod regimes during the different phases of the annual reproductive cycle. In early spring, warm temperature stimulated the recrudescence of the gonads regardless of photoperiod. But during late summer and autumn, a long photoperiod was requred to maintain or initiate the gonadal maturation especially at high temperatures (22-28°C). These results indicate that the initiating factor of the breeding season in this species is a rising temperature, whereas the terminating one is the decreasing daylength at high temperatures. Therefore, in the rose bitterling, the responsiveness of the gonads to photoperiod varies clearly with season. The critical photoperiod for maturation falls

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

83-000894 CONTINUED between 13 and 14 hours of light per day. This critical photoperiod could be changed by a pretreatment of artificial photoperiod during the breeding season.

83-000895 Baugh, T. M. NOTES ON THE REPRODUCTIVE BEHAVIOR OF FIVE SPECIES OF GENUS *FUNDULUS* IN AQUARIA. *J. Aquaricult.* 2(4):86-89. Dec. 1981. SFA 28(2)
[1020 Custer Ave., Ogden, UT 84404]

83-000896 Clavijo, I. E. PAIR SPAWNING AND FORMATION OF A LEK-LIKE MATING SYSTEM IN THE PARROTFISH *SCARUS VETULA*. *Copeia* 1983(1):253-256. 10 Feb. 1983. SFA 28(2)
[Dep. Mar. Sci., Univ. Puerto Rico, Mayaguez, PR 00708]

83-000897 DeMont, D. J. USE OF *LEPOMIS MACROCHIRUS* (RAFINESQUE) NESTS BY SPAWNING *NOTEMIGONUS CRYSOLEUCAS* (MITCHILL) (PISCES: CENTRARCHIDAE AND CYPRINIDAE). *Brimleyana* No. 8. p. 61-63. Dec. 1982. SFA 28(2)
[Dep. Zool., N.C. State Univ., Raleigh 27650] Golden shiners, *Notemigonus crysoleucas*, were observed spawning in bluegill, *Lepomis macrochirus*, nests in a North Carolina pond. Fifty-three percent of the larvae that hatched from eggs taken from one of the nests were golden shiners. This spawning behavior may affect bluegill reproductive success.

83-000898 DeNeff, S. J. and T. A. Villars. FILIAL CANNIBALISM AND NOCTURNAL ILLUMINATION IN PARADISE FISH, *MACROPODUS OPERCULARIS*. *Behav. Neural Biol.* 36(3):295-297. Nov. 1982. SFA 28(2)
[T. A. Villars: Dep. Psychol., Wheaton Coll., Norton, MA 02766] Informal observations had suggested that low-level nocturnal illumination was necessary for egg survival following normal spawning of *Macropodus opercularis*. To confirm those observations, spawned pairs of *M. operularis* were left overnight with their eggs, with either low-level illumination (n = 21) or in complete darkness (n = 23). In complete darkness 17 of 23 paris showed complete egg loss the following morning, while none of the low-level illumination group showed evidence of egg loss. Possible explanations of this phenomenon are discussed.

83-000899 FitzGerald, G. J. THE REPRODUCTIVE ECOLOGY AND BEHAVIOUR OF THREE SYMPATRIC STICKLEBACKS (GASTEROSTEIDAE) IN A SALTMARSH. *Biol. Behav.* 8(1):67-79. 1983. In English with French summ. SFA 28(2)
[Dep. Biol., Univ. Laval, Sts-Foy, PQ G1K 7P4, Canada] The reproductive ecology and behavior of three sticklebacks (Gasterosteidae) breeding sympatrically in tidal salt marsh pools were examined. Data on time of reproduction, fish abundance, nesting densities, male behavior on nests, egg and fry predation by males and females, fecundity and behavior were presented. The spawning times of the three species were similar, but fish abundances differed. *G. wheatlandi* and *P. pungitius* were more abundant and had higher nesting densities than *G. aculeatus*. The parental cycle was similar for all three species but significant differences in fanning behavior and frequency of aggression among the three species were found. *G. aculeatus* and *G. wheatlandi* were generally open area nesters, while *P. pungitius* nested in dense vegetation. All three species predated upon stickleback eggs and fry but *P. pungitius* ate more fry than *G. aculeatus* and *G. wheatlandi*, while the latter two species ate more eggs than did *P. pungitius*. Female fecundities differed in that female *G. aculeatus* were approximately four times as fecund as the other two species. Differences in ecology and behavior of these closely related species were interpreted in terms of mechanisms permitting their coexistence during their breeding season in the structurally simple tidal pools.

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

83-000900 Grant, J. W. A. and P. W. Colgan. REPRODUCTIVE SUCCESS AND MATE CHOICE IN THE JOHNNY DARTER, *ETHEOSTOMA NIGRUM* (PISCES: PERCIDAE). *Can. J. Zool.* 61(2):437-446. Feb. 1983. In English with French summ. SFA 28(2)

[Environ. Serv. Dep., Newfoundland and Labrador Hydro, P.O. Box 9100, St. John's, NF A1A 2X8, Canada] The mate choice of female johnny darters (*Etheostoma nigrum*) was investigated with respect to quality of male parental behaviour. Females apparently preferred males that moved farther out from their nests to respond to intruders. Maximum distance of response to females (MDR to females) was the best predictor of a male's success in acquiring eggs. By choosing a more aggressive male (one with high MDR to females), females increased their fitness because males with a high MDR to females were better able to defend their eggs.

83-000901 Hay, D. E. and J. Fulton. POTENTIAL SECONDARY PRODUCTION FROM HERRING SPAWNING IN THE STRAIT OF GEORGIA. *Can. J. Fish. Aquatic Sci.* 40(2):109-113. Feb. 1983. SFA 28(2)

[Dep. Fish. Oceans, Resour. Serv. Br., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

83-000902 Horoszewicz, L. REPRODUCTIVE RHYTHM IN TENCH, *TINCA TINCA* (L.), IN FLUCTUATING TEMPERATURES. *Aquaculture* 32(1-2):79-92. Apr. 1983. SFA 28(2)

[Inland Fish. Inst., Heated Water Lab., Augustówka 1, 02-981 Warsaw, Poland] Experiments were conducted in heated and control ponds, aimed at determining variations in individual reproductive rhythms in tench, *Tinca tinca* (L). The number of spawnings of a population per season, varying from 3 to 9, showed a positive correlation with the sum of diurnal temperatures higher than 10°C, although the percentage of females participating in spawnings depended upon the pattern of temperature changes during this time. The variability of individual reproductive rhythms increased in seasons with greater temperature fluctuations. In consequence, the number of pausing females (not participating in spawnings) also increased, thereby lowering the increase of absolute fecundity resulting from the increased number of spawnings in higher temperatures. Similarly, duration of the prespawning period depended more upon the pattern of temperature changes at this time than upon temperature level.

83-000903 Jackson, P. B. N. and P. W. Coetzee. SPAWNING BEHAVIOUR OF *LABEO UMBRATUS* (SMITH) (PISCES: CYPRINIDAE). *S. Afr. J. Sci.* 78:293-295. July 1982. SFA 28(2)

[J.L.B. Smith Inst. Ichthyol., P.B. 1015, Grahamstown 6140, South Africa]

83-000904 Johnson, W. J. BODY LENGTHS, BODY WEIGHTS AND FECUNDITY OF SEA LAMPREYS (*PETROMYZON MARINUS*) FROM GREEN BAY, LAKE MICHIGAN. *Trans. Wis. Acad. Sci. Arts Lett.* 70:73-77. 1982. SFA 28(2)

[Univ. Wis. Cent., Marinette] This paper describes the results of measurements of body length, body weights and egg counts of ovarian samples in a representative collection of female sea lempreys from the Peshtigo River, and compares these data to other published regional sea lamprey studies. Specimens were collected during spring spawning runs of 1979 and 1980. Fecundity was determined by counting the number of eggs in one gram samples from each of 14 ovaries, and then multiplying by the total ovarian weight. For each of these parameters, our samples showed means of body length, 484.5 mm; body weight, 267.4 grams, and eggs per female, 97,016. These mean values were greater than any yet published for landlocked Great Lakes sea lamprey populations. Green Bay and its tributaries appear to be highly productive sea lamprey habitat.

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

83-000905 Jovellanos, C. L. and D. E. Gaskin. PREDICTING THE MOVEMENTS OF JUVENILE ATLANTIC HERRING (*CLUPEA HARENGUS HARENGUS*) IN THE SW BAY OF FUNDY USING COMPUTER SIMULATION TECHNIQUES. *Can. J. Fish. Aquatic Sci.* 40(2):139-146. Feb. 1983. SFA 28(2)
[OVC Computer Group, Univ. Guelph, Guelph ON N1G 2W1, Canada]

83-000906 Kruse, G. H. and A. V. Tyler. SIMULATION OF TEMPERATURE AND UPWELLING EFFECTS ON THE ENGLISH SOLE (*PAROPHRYS VETULUS*) SPAWNING SEASON. *Can. J. Fish. Aquatic Sci.* 40(2):230-237. Feb. 1983. SFA 28(2)
[Dep. Fish. Wildl., Oreg. State Univ., Corvallis 97331]

83-000907 Lamon, M. S. and J. A. Ward. MEASURMENTS OF REPRODUCTIVE EFFORT FROM SUCCESSIVE REPRODUCTIVE CYCLES FOR THE ASIAN CICHLID *ETROPLUS MACULATUS*. *Environ. Biol. Fishes* 8(3-4):311-320. 1 Mar. 1983. SFA 28(2)
[Dep. Biol. Sci., Ill. State Univ., Normal 61761]

83-000908 Marraro, C. H. and J. R. Nursall. THE REPRODUCTIVE PERIODICITY AND BEHAVIOUR OF *OPHIOBLENNIUS ATLANTICUS* (PISCES: BLENNIIDAE) AT BARBADOS. *Can. J. Zool.* 61(2):317-325. Feb. 1983. In English with French summ. SFA 28(2)
[J.R. Nursall: Dep. Zool., Univ. Alberta, Edmonton, AB T6G 2E9, Canada] The redlip blenny, *Ophioblennius atlanticus*, spawns chiefly within the first 3h of daylight in the week centred around full moon, probably year-round. A male prepares and guards a nest crevice in his territory; females leave their territories to seek spawning males. A behavioural sequence determines the selection of a female for spawning. Polygyny occurs and possibly polyandry. Male feeding is reduced during spawning period. Spawning females usually are absent from their territories for less than 60 min, but blennies can expel transgressors after absence as long at 660 min, i.e., about one daylight period.

83-000909 McAda, C. W. and R. S. Wydoski. MATURITY AND FECUNDITY OF THE BLUEHEAD SUCKER, *CATOSTOMUS DISCOBOLUS* (CATOSTOMIDAE), IN THE UPPER COLORADO RIVER BASIN, 1975-76. *Southwest Nat.* 28(1):120-123. 18 Feb. 1983. SFA 28(2)
[U.S. FWS, 551 25.5 Rd., Suite B113, Grand Junction, CO 81501]

83-000910 McKaye, K. R. ECOLOGY AND BREEDING BEHAVIOR OF A CICHLID FISH, *CYRTOCARA EUCINOSTOMUS*, ON A LARGE LEK IN LAKE MALAWI, AFRICA. *Environ. Biol. Fishes* 8(2):81-96, 1 Feb. 1983. SFA 28(2)
[Duke Univ. Mar. Lab., Pivers Island, Beaufort, NC 28516] *Cyrtocara eucinostomus*, a mouthbrooding cichlid, breeds on a 4 km long breeding arena between 3-9 m depth in the Cape Maclear region of Lake Malawi. At times over 50,000 males display there, making this breeding arena the largest ever reported. The form and function of the arena and the behavior of the fish on the arena are analogous to bird leks. This arena serves only as a mating ground. All parental care is provided by the females, which leave the arena with the eggs. Courtship takes place in the morning and most of the males leave in the afternoon to forage on zooplankton in deeper water. They return at dusk. The few males that remain on the arena switch their behavior from courting to foraging on zooplankton. Comparisons of this fish arena are made with bird leks and it is concluded that the mating system of this fish can be defined as a lek in the avian sense. 1) There is no male parental care and an absence of monogamous pair bonding. 2) Males and females are sexually dimorphic and there are males present which mimic females to gain entrance

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

83-000910 CONTINUED into the arena. 3) The arena is traditional with a lack of environmental constraints and is away from the primary feeding grounds. In order to determine 1) if this arena could be considered a true lek and 2) what the factors are which account for the location of this remarkably large arena in shallow water, data were collected upon: 1) the depth distribution of *C. eucinostomus*; 2) distribution and size of the nest on the arena; 3) the behavior of the fish on the arena; 4) the feeding habits of *C. eucinostomus*; 5) the distribution of the zooplankton upon which *C. eucinostomus* feeds; 6) water temperature throughout the year; 7) response of males to cormorants; 8) depth distribution and stomach analysis of predatory catfish which feed on *C. eucinostomus*. Based on this natural history data, it is concluded that the occurrence of the arena in shallow water is probably due to *C. eucinostomus* avoiding deep dwelling catfish which feed at night upon them and other cichlids.

83-000911 McPhail, J. D. and D. E. Hay. DIFFERENCES IN MALE COURTSHIP IN FRESHWATER AND MARINE STICKLEBACKS *(GASTEROSTEUS ACULEATUS). Can. J. Zool.* 61(2):292-297. Feb. 1983. In English with French summ. SFA 28(2)

[Inst. Anim. Resour. Ecol., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

83-000912 Middaugh, D. P. and T. Takita. TIDAL AND DIURNAL SPAWNING CUES IN THE ATLANTIC SILVERSIDE, *MENIDIA MENIDIA. Environ. Biol. Fishes* 8(2):97-104. 1 Feb. 1983. SFA 28(2)

[U.S. EPA, Gulf Breeze Environ. Res. Lab., Sabine Island, Gulf Breeze, FL 32561] Field and laboratory observations revealed tidal and diurnal cues for spawning in the atlantic silverside, *Menidia menidia*. In the field spawning runs began approximately when daytime flood tide velocities ranged from 3 to 16 ($\bar{x}$ = 11) cm sec $^{-1}$. Spawning runs ended at ebb tide velocities ranging from 5 to 22 ($\bar{x}$ = 17) cm sec $^{-1}$. In the laboratory, *M. menidia* were reared from embryos to sexual maturity in 10 months (April 1979 to January 1980). During this time, approximately 50 fish were held in each of two, 1 m diameter tanks. A pump was used to maintain a constant current velocity of 8 cm sec $^{-1}$ in the holding tanks. Water temperature ranged from 16 to 25°C, the salinity was 30±2 ^{o}/oo. Fish were fed Tetramin flake food and *Artemia* nauplii each day. During January and February 1980, the seawater circulation pump was turned off twice daily for one hour from 1200 to 1300 and 2400 to 0100. Current velocities decreased from 8.0 cm sec $^{-1}$ to 0.0 cm sec $^{-1}$ during these periods. *M. menidia* held under a 24h light: 0h dark (24 L:0 D) photoperiod spawned from 1200 to 1300 and 2400 to 0100 in response to decreased current velocities. Modification of the photoperiod to 14 L:10 D (with the circulating pump turned off from 1200 to 1300 and 2400 to 0100) resulted in spawning between 0500 and 0600 in response to 'lights-on' and between 1200 and 1300 in response to decreased current velocities. No spawning occurred in response to the decreased current velocities during darkness. The importance of timing of spawning runs to coincide with low current velocities was revealed in tests to determine the duration of viability of sperm and unfertilized eggs. Eggs remained highly viable for only 5 min, sperm for 10 min. Spawning when current velocities were low, reduced dispersion of milt, thus increasing the likelihood of egg fertilization.

83-000913 Mitchell, C. P. and B. P. Penlington. SPAWNING OF *GALAXIAS FASCIATUS* GRAY (SALMONIFORMES: GALAXIIDAE). *N.Z. J. Mar. Freshwater Res.* 16(2):131-133. 1982. SFA 28(2)

[Fish. Res. Div., Minist. Agric. Fish., P.O. Box 951, Rotorua, New Zealand] For the first time *Galaxias fasciatus* Gray were observed spawning. The spawning sites were among flooded terrestrial vegetation along the margins of

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

83-000913 CONTINUED a stream during the peak of a flood. Spawning appeared to be a communal event and the fish were vulnerable to eel (*Anguilla dieffenbachii*) predation at the time. This spawning behaviour may have some effect on the survival of the young and therefore their subsequent whitebait run.

83-000914 Page, L. M.; M. E. Retzer and R. A. Stiles. SPAWNING BEHAVIOR IN SEVEN SPECIES OF DARTERS (PISCES: PERCIDAE). *Brimleyana* No. 8. p. 135-143. Dec. 1982. SFA 28(2)
[Ill. Nat. Hist. Surv., 607 E. Peabody, Champaign 61820] Recent observations reveal that *Percina evides* is an egg-burier, *Etheostoma duryi*, *E. asprigene*, and *E. chlorosomum* are egg-attachers, *E. aquali* and *E. microlepidum* are egg-clumpers, and *E. barbouri* is an egg-clusterer. *Etheostoma duryi* attaches its eggs to rocks; *E. asprigene* and *E. chlorosomum* attach their eggs to plants. With documentation of egg-clumping in *E. aquali* and *E. microlepidum*, three species of the subgenus *Nothonotus* now are known to be egg-clumpers and three to be egg-buriers. Sites of egg-deposition are known for 57 species of darters.

83-000915 Shimizu, A. and I. Hanyu. ENVIRONMENTAL REGULATION OF ANNUAL REPRODUCTIVE CYCLE IN A SPRING-SPAWNING BITTERLING *ACHEILOGNATHUS TABIRA*. *Bull. Jpn. Soc. Sci. Fish.* 48(11):1563-1568. Nov. 1982. SFA 28(2)
[Lab. Fish Physiol., Fac. Agric., Univ. Tokyo, Bunkyo, Tokyo 113, Japan]

83-000916 Stevens, J. D. OBSERVATIONS ON REPRODUCTION IN THE SHORTFIN MAKO *ISURUS OXYRINCHUS*. *Copeia* 1983(1):126-130. 10 Feb. 1983. SFA 28(2)
[Div. Fish., CSIRO Mar. Lab., P.O. Box 21, Cronulla, NSW 2230, Australia] Ninety one *Isurus oxyrinchus* were examined from New South Wales Australia. Males attain sexual maturity at 195 cm total length; females mature at 280 cm. Data obtained from gravid and mature non-gravid specimens confirms that *I. oxyrinchus* is oviphagous. Size at birth is about 70 cm and litter sizes vary from 4 to 16. Parturition off New South Wales probably occurs in November. The length (L)/weight (W) relationship for *I. oxyrinchus* is described by the equation $W = 4.832 \times 10^{-6} L^{3.1}$.

83-000917 Suzuki, R. MULTIPLE SPAWNING OF THE CYPRINID LOACH, *MISGURNUS ANGUILLICAUDATUS*. *Aquaculture* 31(2-4):233-243. Mar. 1983. SFA 28(2)
[Natl. Res. Inst. Aquacult., Tamakicho, Watari-gun, Mie-ken 519-04, Japan]

83-000918 Taylor, J. N. FIELD OBSERVATIONS ON THE REPRODUCTIVE ECOLOGY OF THREE SPECIES OF ARMORED CATFISHES (LORICARIIDAE: LORICARIINAE) IN PARAGUAY. *Copeia* 1983(1):257-259. 10 Feb. 1983. SFA 28(2)
[Dep. Biol. Sci., Fla. Atl. Univ., Boca Raton 33432]

83-000919 Treasurer, J. W. ESTIMATES OF EGG AND VIABLE EMBRYO PRODUCTION IN A LACUSTRINE PERCH, *PERCA FLUVIATILIS*. *Environ. Biol. Fishes* 8(1):3-16. 1 Jan. 1983. SFA 28(2)
[22 Fare Park Dr., Westhill, Aberdeenshire, Scotland] Egg production and survival of perch in the embryonic period, and spawning observations at Lochs Kinord and Davan in Scotland are described. Spawning began on 20 April in both lochs at water temperatures of 9-11°C and continued for 10 days. The length of the incubation period was related to water temperature and was described by the regression equation: $\log_{10}$ days to hatch = 3.0286 -1.6728 $\log_{10}$ incubation temperature in °C. Perch shed eggs in a single opaque strand and egg ribbons could be censused at each loch during the spawning period. The pattern of egg strand distribution and substrate

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

83-000919 CONTINUED used, predominantly the macrophyte *Carex rostrata*, is described. From eggs collected in the lochs it is estimated that 95.3% of embryos were viable, the nonviable portion comprising 0.5% unfertilised eggs, 2.4% dead and 1.8% with abnormalities. Potential egg deposition was 13.5 and 9.7 eggs m^{-2} at Kinord in 1976 and 1977 respectively and 9.2 m^{-2} at Davan in 1976. Egg production as dry weight was assessed as 3.3 and 2.4 mg m^{-2} for Kinord in 1976 and 1977, and 2.2 mg m^{-2} for Davan in 1976. Survival from spawning to hatching in all situations was estimated as 95.3% while the figure calculated for the period from hatching to recruitment to the pelagic larval stock varied from 11.5 to 73.2%.

83-000920 Zoran, M. J. and J. A. Ward. PARENTAL EGG CARE BEHAVIOR AND FANNING ACTIVITY FOR THE ORGANE CHROMIDE, *ETROPLUS MACULATUS*. *Environ. Biol. Fishes* 8(3-4):301-310. 1 Mar. 1983. SFA 28(2)
[Dep. Biol. Sci., Ill. State Univ., Normal 61761]

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC.

83-000921 Helfman, G. S.; D. L. Stoneburner; E. L. Bozeman; P. A. Christian and R. Whalen. ULTRASONIC TELEMETRY OF AMERICAN EEL MOVEMENTS IN A TIDAL CREEK. *Trans. Am. Fish. Soc.* 112(1):105-110. Jan. 1983. SFA 28(2)
[Zool. Dep., Univ. Ga., Athens 30602]

83-000922 Hurley, S. T. and W. A. Hubert. HABITAT ASSOCIATIONS AND MOVEMENTS OF SHOVELNOSE STURGEON IN POOL 13 OF THE UPPER MISSISSIPPI RIVER. *Proc. Iowa Acad. Sci.* 90(1): Mar. 1983. Abstract only. SFA 28(2)
[124 Science II, Iowa State Univ., Ames 50011] Habitat associations and movements of shovelnose sturgeon, *Scaphirynchus platorhynchus*, were studied in Pool 13 of the Upper Mississippi River from March to October of 198[illegible] using radio-telemetry, mark-recapture and catch-per-unit-effort (CPUE) techniques. Seven hundred seventy-eight telemetry observations were made on 22 fish tagged with 49-Mhz transmitters. Radio-tagged sturgeon moved an average of 364 m/day (max. 11.7 km) with 48% of the movements less than 5 m/day. Drifted trammel nets were used to sample sturgeon in channel habitats. One hundred thirty-eight sturgeon were recaptured out of 2,25[illegible] marked with monel strap tags. During high river stages in the spring sturgeon were captured and located most frequently behind wing and closing dams and in areas of main channel border within 50 m of shore. During the summer, sturgeon were found most frequently close to or in the main channel and on the upstream sides of wing and closing dams. Radio-tagged sturgeon were found most frequently between 2 and 7 m in depth, in currents of 20-40 cm/s at the bottom and 40-70 cm/s at the surface.

83-000923 Ikonen, E. and H. Auvinen. RESULTS OF FINNISH STOCKING WITH SEA TROUT (*SALMO TRUTTA* M. *TRUTTA*) IN THE BALTIC SEA IN 1971-1980. *Int. Counc. Explor. Sea* C.M. 1982/M:39. 13p. 1982. In English with French summ. SFA 28(2)
[Finn. Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

83-000924 Ikonen, E.; J. Toivonen and H. Auvinen. ANNUAL REPORT ON THE RESULTS OF THE BALTIC SEA TROUT TRANSFER EXPERIMENT. *Int. Counc. Explor. Sea* C.M. 1982/M:37. 3p. 1982. In English with French summ. SFA 28(2)
[Finn. Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC. (CONTINUED)

83-000925 Ikonen, E.; J. Toivonen and H. Auvinen. REPORT ON THE RESULTS OF THE BALTIC SEA TROUT TAGGING EXPERIMENT. *Int. Counc. Explor. Sea* C.M. 1982/M:36. 3p. 1982. In English with French summ. SFA 28(2)
[Finn. Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

83-000926 Jakobsen, T. MERKEFORSØK MED SEI PÅ NORSKEKYSTEN 1975-1977. [SAITHE TAGGING EXPERIMENTS ON THE NORWEGIAN COAST 1975-1977.] *Fisken Havet* 1982(3):1-29. 1982. In Norwegian with English summ. SFA 28(2)
[Inst. Mar. Res., Bergen, Norway]

83-000927 Kihara, K. INFLUENCES OF THE MARINE ENVIRONMENT UPON THE FORMATIONS OF THE BENTHIC SPECIES COMMUNITY IN THE EASTERN BERING SEA. *Bull. Jpn. Soc. Sci. Fish.* 49(1):49-54. Jan. 1983. SFA 28(2)
[Tokyo Univ. Fish., 5-7, Konan-4, Minato, Tokyo 108, Japan] Influences of water temperature and salinity on the bottom layer upon the formation of the benthic species community were elucidated by analyzing fluctuations of the abundance, the affinity, the biomass diversity and the recurrent group of the benthic species in the eastern Bering Sea through the summers from 1966 and 1971 excluding 1969. Benthic species communities are supposed to be formed by these mutual relations between the stable core species and the unstable species to the environment such as *A. stomias*. The Alaskan Stream Extension Water and the Shelf Water were recognized to have significant effects on this process.

83-000928 LaBar, G. W. and D. E. Facey. LOCAL MOVEMENTS AND INSHORE POPULATION SIZES OF AMERICAN EELS IN LAKE CHAMPLAIN, VERMONT. *Trans. Am. Fish. Soc.* 112(1):111-116. Jan. 1983. SFA 28(2)
[Sch. Nat. Resour., Univ. Vt., Burlington 05405]

83-000929 Olney, J. E. EGGS AND EARLY LARVAE OF THE BAY ANCHOVY, *ANCHOA MITCHILLI*, AND THE WEAKFISH, *CYNOSCION REGALIS*, IN LOWER CHESAPEAKE BAY WITH NOTES ON ASSOCIATED ICHTHYOPLANKTON. *Estuaries* 6(1):20-35. Mar. 1983. SFA 28(2)
[Va. Inst. Mar. Sci., Gloucester Point, VA 23062]

83-000930 Parmanne, R. and V. Sjöblom. RECAPTURES OF BALTIC HERRING TAGGED OFF THE COAST OF FINLAND IN 1975-81. *Inst. Counc. Explor. Sea* C.M. 1982/J:19. 12p. 1982. In English with French summ. SFA 28(2)
[Finn. Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

83-000931 Percy, W. G. and K. Masuda. TAGGED STEELHEAD TROUT (*SALMO GAIRDNERI* RICHARDSON) COLLECTED IN THE NORTH PACIFIC BY THE OSHORO-MARU, 1980-1981. *Bull. Fac. Fish. Hokkaido Univ.* 33(4):249-254. Nov. 1982. SFA 28(2)
[Sch. Oceanogr., Oreg. State Univ., Corvallis 97331] Thirteen steelhead trout (*Salmo gairdneri*) with coded-wire tags (CWT's) were captured in gillnets fished by the Oshoro-Maru in the Gulf of Alaska along 145°W in 1980 and 1981 and along 180° in 1981. These fish originated from hatcheries in Oregon, Washington and Idaho, U.S.A., and British Columbia, Canada. About 7% of all steelhead caught had CWT's. One age 1.0 steelhead entered the ocean about two months before it was captured after migrating at sea at least 1,641 km. Scales of the steelhead caught in gillnets indicated that most were

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC. (CONTINUED)

83-000931 CONTINUED "wild", nonhatchery fish, having spent 2 or 3 years in fresh water, and 0, 1 or 2 years in the ocean.

83-000932 Power, J. H. A NUMERICAL METHOD FOR SIMULATING PLANKTON TRANSPORT AND SIMULATION OF THE NORTH ATLANTIC OCEAN DRIFT OF *ANGUILLA* LEPTOCEPHALI. *Ph.D. dissertation, Univ. Me.* 85p. 1982. From Diss. Abstr. Int. B Sci. Eng. 43(9):2794. Mar. 1983. SFA 28(2)

Leptocephali were "started" at various points in the presumed American and European eel spawning areas, and the model produced spatiotemporal patterns of leptocephalus concentrations resulting from surface current drift and turbulent diffusion. In the American eel drift simulations the patterns followed a sequence of four phases: (1) initial northwest drift on the presumed Antilles Current; (2) the formation of a "patch" of leptocephali offshore of Florida and the Gulf Stream; (3) dispersal along the North American coast resulting from the continued input of larvae into the Gulf Stream from the patch; and (4) transport eastward into the Atlantic on the Gulf Stream. In the European eel drift simulation the leptocephali slowly spread throughout the Sargasso Sea region of the North Atlantic, and there was little Gulf Stream transport by the eighth month of drift. The patterns of distribution produced by the model correspond well with the limited collection data for both species, though it remains for future sampling efforts to verify whether the features present in the simulations actually occur.--from abstr.

83-000933 Ross, J. L.; J. S. Pavela and M. E. Chittenden, Jr. SEASONAL OCCURRENCE OF BLACK DRUM, *POGONIAS CROMIS*, AND RED DRUM, *SCIAENOPS OCELLATUS*, OFF TEXAS. *Northeast Gulf Sci.* 6(1):67-70. Feb. 1983. SFA 28(2)

[N.C. Div. Mar. Fish., N.C. Mar. Res. Cent., Air Port Rd., Manteo 27954]

83-000934 Shenker, J. M.; D. J. Hepner; P. E. Frere; L. E. Currence and W. W. Wakefield. UPRIVER MIGRATION AND ABUNDANCE OF NAKED GOBY (*GOBIOSOMA BOSCI*) LARVAE IN THE PATUXENT RIVER ESTUARY, MARYLAND. *Estuaries* 6(1):36-42. Mar. 1983. SFA 28(2)

[Sch. Oceanogr., Oreg. State Univ., Corvallis 97330] Larvae of the naked goby, *Gobiosoma bosci*, were collected during the spring and early summer of 1977 in the upper tidal Patuxent River, Maryland. Larvae first appeared in the collections on May 5. Weekly night sampling at 26 stations covering 2[illegible] km of the Patuxent illustrated the upriver movement of larvae, at an estimated rate of about 1 km per day. Larval densities quickly reached high levels, with a maximum density of more than 6,000 larvae per 100 m^3 at one station on June 16. By June 23, the mean larval density for the entire 28 km stretch of the river was 1,825 larvae per 100 m^3. Length-frequency distributions of the larvae illustrate the growth of the larvae, continual recruitment into the population, and a gradient in mean population length over the sampling transect that was due to the presence of the smallest larvae in the lower stations.

FOODS/FEEDING

83-000935 Adams, P. B. FEEDING BEHAVIOR OF THE WIDOW ROCKFISH (*SEBASTES ENTOMELAS*), A DIURNALLY FEEDING ROCKFISH. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 198-204. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad,

FOODS/FEEDING (CONTINUED)

83-000935 CONTINUED eds. Gutshop '81. Fish Food Habits Studies, Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000936 Allen, J. R. M. and R. J. Wootton. RATE OF FOOD CONSUMPTION IN A POPULATION OF THREESPINE STICKLEBACKS, *GASTEROSTEUS ACULEATUS*, ESTIMATED FROM THE FAECAL PRODUCTION. *Environ. Biol. Fishes* 8(2):157-162. 1 Feb. 1983. SFA 28(2)

[R.J. Wootten: Dep. Zool., Univ. Coll. Wales, Aberystwyth, SY23 3DA, Dyfed, Wales] The daily rate of faecal production by threespine sticklebacks living in a small lake was measured at monthly intervals. Laboratory experiments yielded a regression model which allowed the prediction of the rate of food consumption from faecal production. It was estimated that the annual rate of consumption was 12,800 mg per fish. The highest rate of food consumption was in early summer. The experiments also showed that the absorption efficiency was greater at higher temperatures and for heavier fish.

83-000937 Allen, M. J. LARGE-SCALE CONSIDERATIONS IN STUDIES OF RESOURCE PARTITIONING. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 185-189. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies, Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000938 Armstrong, M. L. and A. V. Brown. DIEL DRIFT AND FEEDING OF CHANNEL CATFISH ALEVINS IN THE ILLINOIS RIVER, ARKANSAS. *Trans. Am. Fish. Soc.* 112(2B):302-307. Mar. 1983. SFA 28(2)

[Ark. Game Fish Comm., Rt.1, Box 477, Hot Springs 71901]

83-000939 Barber, W. E. and W. L. Minckley. FEEDING ECOLOGY OF A SOUTHWESTERN CYPRINID FISH, THE SPIKEDACE, *MEDA FULGIDA* GIRARD. *Southwest. Nat.* 28(1):33-40. 18 Feb. 1983. SFA 28(2)

[Wildl. Fish. Prog., Univ. Alaska, Fairbanks 99701] Feeding ecology of the spikedace, *Meda fulgida*, was investigated from July 1966 to August 1967. Foods eaten by 505 fish consisted primarily of mayfly adults (36.5%) and nymphs (33.3%). Unidentified animal material and larval dipterans each made up an additional 9%. There were seasonal trends in dominant food organisms eaten, with mayflies making up 80% in spring and early summer and <40% in late summer and autumn. Dipteran larvae decreased in importance with increase in fish size, with a concomitant increase in importance of mayfly numphs and adults. There was diel periodicity in feeding intensity with a peak in late afternoon and early evening. Fish occupying pools fed exclusively on mayflys, but those in riffles and runs contained more diversified foods.

83-000940 Blankley, W. O. FEEDING ECOLOGY OF THREE INSHORE FISH SPECIES AT MARION ISLAND (SOUTHERN OCEAN). *S. Afr. J. Zool.* 17(4):164-170. 1982. SFA 28(2)

[Sch. Environ. Stud., Univ. Cape Town, Rondebosch, South Africa] The diets, morphological features and habitats of 258 specimens of the three inshore fish species *Notothenia coriiceps*, *N. macrocephala* and *Harpagifer georgianus* from Marion Island are described and compared. Correspondence analysis of the three diets shows the existence of three clearly defined feeding niches despite the occurrence of some common prey species. Inter- and intraspecific similarities and differences in the diets of small and large size classes of each species are also displayed by correspondence analysis. Size-limited predation by *N. coriiceps* of the limpet *Nacella*

FOODS/FEEDING (CONTINUED)

83-000940 CONTINUED *delesserti* is described. Differences in the habitats occupied by the fish appear to be important in determining the species composition of their diets.

83-000941 Bohnsack, J. A. EFFECTS OF PISCIVOROUS PREDATOR REMOVAL ON CORAL REEF FISH COMMUNITY STRUCTURE. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 258-267. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies, Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000942 Bur, M. T. FOOD OF FRESHWATER DRUM IN WESTERN LAKE ERIE. *J. Great Lakes Res.* 8(4):672-675. 1982. SFA 28(2)

[U.S. FWS, Sandusky Biol. Stn., Sandusky, OH 44870] The abundance of freshwater drum (*Aplodinotus grunniens*) suggests they play an important role in the Lake Erie ecosystem. Our analysis of freshwater drum digestive tracts and macrobenthic samples collected from western Lake Erie indicates that drum were selective feeders. Planktonic cladocerans and larval midges (Chironomidae) were the primary prey organisms eaten by drum. Young-of-the-year fed mostly on cladocerans, while yearling and older drum ate both cladocerans and midge larvae. Decapods, pelecypods, and fish were found only in the digestive tracts of drum longer than 250 mm. While the most abundant organisms in benthic samples were cladocerans (ephippial) and oligochaetes (89.5% by number), they constituted less than 1% of the diet. An evaluation of food selectivity, using Ivlev's index of electivity for benthic organisms, indicated that adult drum preferred midges to any other benthic food.

83-000943 Butler, G. S. DAILY FEEDING PERIODICITY OF THE INTERTIDAL GOBY *CAFFROGOBIUS CAFFER*. *S. Afr. J. Zool.* 17(4):182-189. 1982. SFA 28(2)

[59 Second Ave., Talboton, 2192, South Africa] The daily feeding periodicity of *Caffrogobius caffer* was investigated at three sites in the eastern Cape. Two 24-h collections were taken at each collection site. Three methods were used to examine stomach contents. Relative stomach fullness was assessed for all six collections, while back-calculated time of ingestion and dry mass of the stomach contents as a percentage of dry somatic mass were applied to two collections each. The results from the three methods were similar. Feeding activity of *C. caffer* was not influenced by tide phase; peaks of feeding occurred during both high and low tide. Feeding occurred throughout the day with a tendency for slight crepuscular peaks of feeding activity.

83-000944 Cassani, J. R. and W. E. Caton. FEEDING BEHAVIOUR OF YEARLING AND OLDER HYBRID GRASS CARP. *J. Fish Biol.* 22(1):35-41. Jan. 1983. SFA 28(2)

[Lee Cty. Hyacinth Control Dist., P.O. Box 06005, Fort Myers, FL 33906] Hybrid grass carp resulting from the cross of a female grass carp, *Ctenopharyngodon idella* (Val.), and a male bighead carp, *Hypophthalmichthys (Aristichthys) nobilis* Rich., 12-18 months old (*c.* 300 mm T.L.) were studied in a two-part experiment to determine feeding preference and total daily consumption fish $^{-1}$ on selected species of aquatic plants. Fish were maintained in circular pools with 6840.8l of water inside a temperature-controlled greenhouse. Preference tests were conducted at three temperature ranges; 25-28°C, 17-20°C and 12-15°C. Based on the time to complete consumption or the relative quantity consumed, the most preferred plant was *Lemna gibba* when in combination with six other species. *Chara* sp., *Najas guadalupensis* and *Potamogeton pectinatus* were readily consumed and considered to be of about equal preference. *Ceratophyllum demersum* and *Myriophyllum brasiliense* were least preferred. Hybrid grass carp generally consumed as much plant material

FOODS/FEEDING (CONTINUED)

83-000944 CONTINUED species^{-1} and in the same order of preference at the 12-15°C range as they did at 25-28°C. In the second part, mean daily consumption (g) fish^{-1} at 25.7-31.0°C for five plant species tested separately was as follows: *Chara* sp. 369.8; *Lemna gibba* 178.2; *Najas guadalupensis* 172.6; *Hydrilla verticillata* 106.4 and *Ceratophyllum demersum* 8.8.

83-000945 Chapman, J.; C. Onuf and M. Quammen. EFFECTS OF FISH PREDATION ON PERACARID CRUSTACEANS IN MUGU LAGOON, CALIFORNIA. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 274-285. Dec. 1982. In: G. M. CAilliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies, Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000946 Chess, J. R. PREDATOR-PREY STUDIES OF THE SHORTBELLY ROCKFISH. OFFSHORE SAMPLING PROBLEMS. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 58-62. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies. Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000947 Cochran, P. A. and J. A. Rice. A COMPARISON OF BIOENERGETICS AND DIRECT FIELD ESTIMATES OF CUMULATIVE SEASONAL FOOD CONSUMPTION BY LARGEMOUTH BASS (*MICROPTERUS SALMOIDES*). *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 88-96. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies. Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000948 Cohen, E. B. and M. D. Grosslein. FOOD CONSUMPTION BY SILVER HAKE (*MERLUCCIUS BILINEARIS*) ON GEORGES BANK WITH IMPLICATIONS FOR RECRUITMENT. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 286-294. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop'81. Fish Food Habits Studies, Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000949 Colton, D. E. and W. S. Alevizon. FEEDING ECOLOGY OF BONEFISH IN BAHAMIAN WATERS. *Trans. Am. Fish. Soc.* 112(2A):178-184. Mar. 1983. SFA 28(2)
[Dep. Biol. Sci., Fla. Inst. Technol., Melbourne 32901]

83-000950 Cowen, R. K. THE EFFECT OF SHEEPHEAD (*SEMICOSSYPHUS PULCHER*) PREDATION ON THE ABUNDANCE AND MICROHABITAT UTILIZATION OF SEA URCHINS. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 268-273. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies, Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000951 Cross, J. N. RESOURCE PARTITIONING IN THREE ROCKY INTERTIDAL FISH ASSEMBLAGES. *Wash. Sea Grant Prog.* WSG-WO p. 82-2. 142-150. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies. Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

FOODS/FEEDING (CONTINUED)

83-000952 Crow, M. E. SOME STATISTICAL TECHNIQUES FOR ANALYZING TH STOMACH CONTENTS OF FISH. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 8-15. Dec 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Foo Habits Studies. Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Se Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000953 Crow, M. E. THE LACK OF TIME LIMITATION IN FISH FORAGING. *Was Sea Grant Prog.* WSG-WO 82-2. p. 47-55. Dec. 1982. In: G. M. Cailliet and A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies, Wash. Sea Grat Seattle. Available @ $8.00 from Wash. Sea Grant Commun, 3716 Brooklyn Av NE, Seattle, WA 98105. SFA 28(2)

83-000954 Crowder, L. B. and F. P. Binkowski. FORAGING BEHAVIORS AND TH INTERACTION OF ALEWIFE, *ALOSA PSEUDOHARENGUS*, AND BLOATER, *COREGONUS HOYI Environ. Biol. Fishes* 8(2):105-113. 1 Feb. 1983. SFA 28(2)

[Lab. Limnol., Dep. Zool., Univ. Wis., Madison 53706] Alewife, *Alo pseudoharengus*, and bloater, *Coregonus hoyi*, are common planktivores Lake Michigan. Both alewife and bloater use a variety of feeding mode Alewives can filter, gulp and particulate feed; bloaters can only gulp a particulate feed. We examined handling time per prey and probability capture for alewife and bloater particulate feeding on *Mysis relicta*. Usi these estimates and available data for filtering alewives, cost curves we derived for alewife and bloater particulate feeding and for alewife usi all three modes of feeding. Alewives filter small prey relative to their c body size and particulate feed on larger prey. Feeding mode appears to dependent on prey size and density and shifts in feeding mode are apparent based on maximizing biomass eaten per time. The ability to filter confer competitive advantage on alewife when small prey are abundant as they we in the mid 1960s in Lake Michigan. If the zooplankton are larger, bloat young-of-year do not suffer this relative disadvantage. In fact, lar bloaters can consume prey on the bottom not available to alewife. Th shifting competitive balance may explain, in part, the observed dynamics alewife and bloater.

83-000955 Dawidowicz, P. and Z. M. Gliwicz. FOOD OF BROOK CHARR IN EXTRE OLIGOTROPHIC CONDITIONS OF AN ALPINE LAKE. *Environ. Biol. Fishes* 8(1):5 60. 1 Jan. 1983. SFA 28(2)

[Dep. Hydrobiol., Univ. Warsaw, Nory Świat 67, 00-046 Warsaw, Poland] stunted form of *Salvelinus fontinalis* has persisted since its introducti in 1948 in ultra oligotrophic Zielony Lake in the Tatra Mountains, southe Poland, despite extremely poor available food. The charr shifts fr feeding on airborne insects to benthic chironomid larvae when the lake frozen in October, and to the sole planktonic crustacean survivor (*Cyclo abyssorum tatricus*) when access to the sediments becomes difficult due oxygen depletion in April-May. The plankton food resource enables the cha to survive till June, when the ice-cover breaks up. Due to charr predati the old *Cyclops* generation becomes extinct in May, but *Cyclops* eggs hat after passing through the charr intestine unharmed. Each new *Cyclo* generation explodes due to the absence of cannibalistic adults, which ha been removed by the charr, and persists in high densities until the ne April-May when the egg-carrying females (highly selected by the char appear again to focus the charr attention on planktonic food resources.

83-000956 Dudgeon, D. THE UTILIZATION OF TERRESTRIAL PLANTS AS A FO SOURCE BY THE FISH STOCK OF A GENTLY SLOPING MARGINAL ZONE IN PLOVER CO RESERVOIR, HONG KONG. *Environ. Biol. Fishes* 8(1):73-77. 1 Jan. 1983. SFA

FOODS/FEEDING (CONTINUED)

83-000956 CONTINUED 28(2)
[Dep. Zool., Univ. Hong Kong, Hong Kong] A study of the feeding habits of the fish stock of a gently sloping marginal zone of Plover Cove Reservoir, Hong Kong, has been carried out. Analysis of the stomach contents of five species of fish revealed that, after a rise in water level which led to the inundation of considerable quantities of terrestrial vegetation, such plants were the major dietary item of the animals collected. This finding was consistent whether the points, occurrence or dominance methods of gut content analysis were used. Additionally, statistical analysis of these data strongly suggested that the fish migrated into the marginal zone to feed upon the flooded material thus raising the possibility that these animals are normally food limited. A discussion of the findings of this study indicated that the fish in Plover Cove Reservoir played an important role as agents of transmission and conversion of the input of allochthonous carbon compounds from the surrounding terrestrial environment.

83-000957 Dunbrack, R. L. and L. M. Dill. A MODEL OF SIZE DEPENDENT SURFACE FEEDING IN A STREAM DWELLING SALMONID. *Environ. Biol. Fishes* 8(3-4):203-216. 1 Mar. 1983. SFA 28(2)
[Dep. Biol. Sci., Simon Fraser Univ. Burnaby, BC V5A 1S6, Canada] A model is developed which predicts the size composition of drifting surface food in the diet of a stream dwelling salmonid. Parameters included in the model are fish reaction distance to food, probability of successful capture (attack and ingestion), and surface drift size composition. Reaction distance and probability of successful capture were found to be functions of both fish length and food width. A test of the model showed no significant differences between its predictions and the actual diet composition of juvenile coho salmon, *Oncorhynchus kisutch*, collected in the field. The results are discussed in light of morphological considerations.

83-000958 Ebeling, A. W. and D. R. Laur. DOES RESOURCE PARTITIONING HAVE A DESCRIPTIVE NULL HYPOTHESIS? *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 158-165. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies. Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000959 Eggers, D. M. BIOENERGETIC SIGNIFICANCE OF PREY SIZE PREFERENCE BY LAKE WASHINGTON JUVENILE SOCKEYE SALMON. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 70-79. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies. Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000960 English, K. K. PREDATOR-PREY RELATIONSHIPS FOR JUVENILE CHINOOK SALMON, *ONCORHYNCHUS TSHAWYTSCHA*, FEEDING ON ZOOPLANKTON IN "IN SITU" ENCLOSURES. *Can. J. Fish. Aquatic Sci.* 40(3):287-297. Mar. 1983. In English with French summ. SFA 28(2)
[LGL Ltd., 2453 Beacon Ave., Sidney, BC V8L 1X7, Canada]

83-000961 Goldschmid, A. ÖKOMORPHOLOGISCHE TRENNUNG ZWEIER MEDITERRANER SCHLEIMFISCHARTEN: *BLENNIUS INCOGNITUS* BATH, 1968 UND *B. ZVONIMIRI* KOLOMBATOVIC, 1892 (BLENNIIDAE; TELEOSTEI: PISCES). [ECOMORPHOLOGICAL SEPARATION OF TWO MEDITERRANEAN BLENNIID SPECIES: *BLENNIUS INCOGNITUS* BATH, 1968 AND *B. ZVONIMIRI* KOLOMBATOVIC, 1892 (BLENNIIDAE; TELEOSTEI; PISCES).] *Z. Zool. Syst. Evolutionsforsch.*

FOODS/FEEDING (CONTINUED)

83-000961 CONTINUED 20(4):302-316. Dec. 1982. In German with Englis summ. SFA 28(2)
[Zool. Inst., Univ. Salzburg, Austria]

83-000962 Greenfield, D. W.; C. F. Rakocinski and T. A. Greenfield SPATIAL AND TROPHIC INTERACTIONS IN WET AND DRY SEASONS BETWEEN *GAMBUSI LUMA* AND *GAMBUSIA SEXRADIATA* (PISCES: PEOCILIIDAE) IN BELIZE, CENTRA AMERICA. *Fieldiana Zool. New Ser.* No. 14. v + 16p. 13 Jan. 1983. SFA 28(2)
[Dep. Biol. Sci., North. Ill. Univ., DeKalb]

83-000963 Grobecker, D. B. THE 'LIE-IN-WAIT' FEEDING MODE OF A CRYPTI TELEOST, *SYNANCEIA VERRUCOSA*. *Environ. Biol. Fishes* 8(3-4):191-202. 1 Mar 1983. SFA 28(2)
[Coll. Fish., WH-10, Univ. Wash., Seattle 98195]

83-000964 Grossman, G. D. COMMUNITY REGULATION AND PATTERNS OF RESOURC PARTITIONING. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 166-177. Dec. 1982. In G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habit Studies. Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Gran Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000965 Hixon, M. A. DIFFERENTIAL FISH GRAZING AND BENTHIC COMMUNI STRUCTURE ON HAWAIIAN REEFS. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 249-25 Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fis Food Habits Studies, Wash. Sea Grant, Seattle. Available @ $8.00 from Was Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000966 Irvine, G. V. THE IMPORTANCE OF BEHAVIOR IN PLANT-HERBIVOR INTERACTIONS: A CASE STUDY. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 240-248 Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fis Food Habits Studies, Wash. Sea Grant, Seattle. Available @ $8.00 from Wash Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000967 Kirillov, A. F. FEEDING OF PIZHYAN, *COREGONUS LAVARETU PIDSCHIAN* (SALMONIDAE), IN VILYUYSK RESERVOIR. *J. Ichthyol. (Engl. Transl Vopr. Ikhtiol.)* 22(3):55-62. 1982. SFA 28(2)
[Inst. Biol. Yakutian Br., Siberian Div. USSR Acad. Sci., USSR]

83-000968 La Bolle, L. D., Jr. CONSTRAINTS OF THE LABORATORY ENVIRONMENT ON PREDATOR-PREY SYSTEMS IN FISHES. *Wash. Sea Grant Prog.* WSG-WO 82-2. p 24-32. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81 Fish Food Habits Studies. Wash. Sea Grant, Seattle. Available @ $8.00 fro Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000969 Last, P. R. NOTES ON THE FEEDING ECOLOGY OF FOUR SYMPATRIC LEATHERJACKETS (PISCES: MONACANTHIDAE) FROM TASMANIA. *Tasmanian Fish Res.* No. 25. p. 17-25. Mar. 1983. SFA 28(2)
[Tasmanian Fish. Dev. Auth., Res. Resour. Lab., Crayfish Point, Taroona, Tasmania 7006] A brief study of the dietary relationships of four sympatric species of leatherjackets (*Meuschenia australis, M. freycineti,*

FOODS/FEEDING (CONTINUED)

83-000969 CONTINUED *Acanthaluteres spilomelanurus* and *Penicipelta vittiger*) showed that all species were omnivorous and exhibited diverse food habits. Although prey species overlaps occurred, subtle food preference differences between species were apparent. These may relate to the adult sizes and oral anatomies. *Acanthaluteres spilomelanurus* and *Penicipelta vittiger* ingested large amounts of algae and small invertebrates such as amphipods, bivalves and hydrozoans. The smaller *A. spilomelanurus*, selected smaller prey species than its larger relative. Both *Meuschenia* species possessed strong accuminated teeth suitable for crushing hard exoskeletal material. These species exhibited a preference for larger macro-invertebrates such as sponges, echinoderms and larger molluscs. Differences in the amounts of each component were evident between the species.

83-000970 Laur, D. R. and A. W. Ebeling. PREDATOR-PREY RELATIONSHIPS IN SURFPERCHES. *Environ. Biol. Fishes* 8(3-4):217-229. 1 Mar. 1983. SFA 28(2)
[Mar. Sci. Inst., Univ. Calif., Santa Barbara, CA 93106] Five species of relatively large surfperches (Embiotocidae) exploit the small prey in benthic 'turf' on a kelp-forested reef off southern California. Turf contained inorganic debris and 'items of doubtful food value' (plants, colonial animals, etc.) which fish mostly rejected, and 'items of food value' (amphipods, etc.) which they selected. In mode of food handling, two species selected their food by taking careful bites and swallowing all items, either by picking out small amphipods etc. from algae or plucking larger prey and crushing it between strong pharyngeal teeth. The three others selected food by winnowing bites of turf in their mouth and spitting out the cast. For each species, distribution of foraging effort among microhabitats differed significantly from random, for one species more noticeably so than for the others. All species generally preferred microhabitats with highest densities of valued food items. All but one foraged during the day only. Functional morphological specializations may constrain their foraging modes and diets. The presumed most generalized mode is 'browser-picker'; 'crunching' and 'oral-winnowing' are more specialized. The surfperches' elaborate pharyngognathy is a likely basis of these specializations for greater foraging efficiency.

83-000971 Laur, D. R. and A. W. Ebeling. PREDATOR-PREY RELATIONSHIPO IN A GUILD OF SURFPERCHES. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 227. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies, Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. Synopsis only. SFA 28(2)

83-000972 Levy, D. A. and I. Yesaki. GRAPHICAL METHODS FOR FISH STOMACH ANALYSIS. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 16-23. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies. Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000973 Light, R. W.; P. H. Adler and D. E. Arnold. EVALUATION OF GASTRIC LAVAGE FOR STOMACH ANALYSES. *N. Am. J. Fish. Manage.* 3(1):81-85. 1983. SFA 28(2)
[Pa. Coop. Fish. Wildl. Unit, Ferguson Bldg., University Park 16802]

83-000974 Macdonald, J. S. LABORATORY OBSERVATIONS OF FEEDING BEHAVIOUR OF THE OCEAN POUT (*MACROZOARCES AMERICANUS*) AND WINTER FLOUNDER (*PSEUDOPLEURONECTES AMERICANUS*) WITH REFERENCE TO NICHE OVERLAP OF

FOODS/FEEDING (CONTINUED)

83-000974 CONTINUED NATURAL POPULATIONS. *Can. J. Zool.* 61(3):539-546 Mar. 1983. In English with French summ. SFA 28(2)

[Dep. Fish. Oceans, West Vancouver Lab., 4160 Marine Dr., West Vancouver BC V7V 1N6, Canada] Laboratory observations of winter flounder and ocean pout feeding on a variety of natural prey items provide an example of feeding methods influencing food resource division among syntopic fish. The ocean pout sorts mouthfuls of bottom sediment to obtain infaunal prey such as bivalves. The winter flounder relies more on vision to select prey exposed on the surface of the substrate. Winter flounder were also seen to remove the viscera from shells of bivalves that presumably were too large to swallow; however, the required increase in handling time may make bivalves suboptimal prey.

83-000975 Marrin, D. L. ONTOGENETIC CHANGES AND INTRASPECIFIC RESOURCE PARTITIONING IN THE TAHOE SUCKER, *CATOSTOMUS TAHOENSIS*. *Environ. Biol. Fishes* 8(1):39-47. 1 Jan. 1983. SFA 28(2)

[Dep. Hydrol. Water Resour., Univ. Ariz., Tucson 85721] Intraspecific resource partitioning among three size classes of tahoe sucker was investigated in a small subalpine lake in California. Distribution of fish was determined by underwater observation, and stomach content analysis provided information on dietary patterns. Juvenile fish were restricted to shallow or weedy areas of the lake, while adult sucker occupied a variety of habitats and exhibited a diel migration from deep water by day to near shore at night. All size classes displayed some schooling during the day, but fed solitarily in the littoral benthic regions at night. Ontogenetic changes in food habits were a result of adult fish foraging in a greater number of habitats and feeding on different prey types than juveniles. Temporal partitioning appeared to be less important than either trophic or habitat partitioning.

83-000976 Maule, A. G. THE SPRING DIETS OF WALLEYE IN THE LOWER COLUMBIA RIVER, 1980-1981. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 205-210. Dec. 1982. In: G. M. Cailliet and C. a. Simenstad, eds. Gutshop '81. Fish Food Habits Studies, Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000977 McClearn, D. and P. A. Unger. NONVISUAL PREDATION BY A PLANKTIVOROUS FISH. *J. Colo.-Wyo. Acad. Sci.* 15(1):16. Apr. 1983. Abstract only. SFA 28(2)

83-000978 Mills, E. L. AND J. L. Forney. IMPACT ON *DAPHNIA PULEX* OF PREDATION BY YOUNG YELLOW PERCH IN ONEIDA LAKE, NEW YORK. *Trans. Am. Fish. Soc.* 112(2A):154-161. Mar. 1983. SFA 28(2)

[Dep. Nat. Resour., Cornell Univ., Ithaca, NY 14853]

83-000979 Moyle, P. B.; B. Herbold and R. A. Daniels. RESOURCE PARTITIONING IN A NON-COEVOLVED ASSEMBLAGE OF ESTUARINE FISHES. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 178-184. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies, Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, SEattle, WA 98105. SFA 28(2)

83-000980 Owen, B.; R. Deehr and F. L. Snyder. COMPARATIVE FOOD HABITS OF YOUNG WHITE PERCH (*MORONE AMERICANA* (GMELIN)) AND WHITE BASS (*MORONE CHRYSOPS* (RAFINESQUE)) IN OLD WOMAN CREEK ESTUARY. *Ohio J. Sci.*

FOODS/FEEDING (CONTINUED)

83-000980 CONTINUED 83(2):5. Apr. 1983. Abstract only. SFA 28(2)
[Old Woman Creek Natl. Estuarine Sanctuary, 2514 Cleveland Rd. East, Huron, OH] Bi-weekly seine collections of white perch and white bass were made in Old Woman Creek Estuary between May and December, 1982. These collections provided base-line data on the usage of the estuary by the two species and their individual food habits. The predominance of yoy (young-of-year) and yearling fish of both species in the seines would indicate that these two species are using the estuary as a nursery area. Both yoy and yearling white perch feed opportunistically on food items which are seasonally abundant. Yoy and yearling white bass were found to be almost entirely piscivorous. These preliminary findings suggest little or no direct competition for food between the native white bass and the alien white perch in this area.

83-000981 Paszkowski, C. A. and W. M. Tonn. AN EXPERIMENTAL STUDY OF FORAGING SITE SELECTION IN YOUNG-OF-THE-YEAR YELLOW PERCH, *PERCA FLAVESCENS*. *Environ. Biol. Fishes* 8(3-4):283-292. 1 Mar. 1983. SFA 28(2)
[Dep. Zool., Lab. Limnol., Univ. Wis., Madison 53706] We performed a series of laboratory experiments to identify and evaluate preferences of young-of-the-year yellow perch for using six foraging sites, and to relate these preferences to the observed diet of perch in nature. The six foraging sites, the water surface, floating vegetation, open water column, submerged macrophytes, open substrate, and benthic cover, were simulated by artificial devices in 56.8 l aquaria. The distribution of the number of food items removed from the six foraging sites did not differ significantly from random. The order of removals, however, revealed significant preferences. The water column site was selected before all others, while the surface and the floating vegetation sites were used last. Handling time efficiencies showed nearly opposite patterns: the midwater site required a longer handling time than all other sites while the surface and floating vegetation were among those sites with the shortest handling times. The selection of foraging sites was essentially independent of the order of encountering the feeding devices, and was not affected by experimental experience. The foraging site selection by the fish in our experiments corresponds to naturally important foraging sites for perch of the same size. Our results suggest that preference for a foraging site, whether genetic or due to early experience, can override immediate profitability.

83-000982 Pearcy, W. G.; T. Nishiyama; T. Fugii and K. Masuda. VARIATIONS IN THE FEEDING HABITS OF SALMON CAUGHT IN GILLNETS DURING A 24-HOUR PERIOD. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 224-226. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies, Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000983 Pennington, M.; R. Bowman and R. Langton. VARIABILITY OF THE WEIGHT OF STOMACH CONTENTS OF FISH AND ITS IMPLICATION FOR FOOD STUDIES. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 2-7. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies. Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. N.E., Seattle, WA 98105. SFA 28(2)

83-000984 Persson, L. FOOD CONSUMPTION AND COMPETITION BETWEEN AGE CLASSES IN A PERCH *PERCA FLUVIATILIS* POPULATION IN A SHALLOW EUTROPHIC LAKE. *Oikos* 40(2):197-207. Feb. 1983. In English with Russian summ. SFA 28(2)
[Inst. Limnol., Box 3060, S-220 03 Lund, Sweden] Food consumption rates and niche relationships in different age classes of a perch *Perca fluviatilis* population were studied in a shallow eutrophic lake. Compared with other

FOODS/FEEDING (CONTINUED)

83-000984 CONTINUED studies, food consumption was low, suggesting that the fish were highly resource limited. Food overlap was high. The age classes could not segregate on the habitat dimension to any large extent, because of the pronounced habitat homogeneity. When comparing perch populations in lakes differing in area, depth and transparency, the length class diversity was higher in more transparent lakes which offered a more diversified habitat for visually hunting predators such as perch. It is argued that intraspecific competition limits the diversity and number of age classes, all the more the lower the habitat heterogeneity.

83-000985 Prince, J. D.; I. C. Potter; R. C. J. Lenanton and N. R. Loneragan. SEGREGATION AND FEEDING OF ATHERINID SPECIES (TELEOSTEI) IN SOUTH-WESTERN AUSTRALIAN ESTUARIES. *Aust. J. Mar. Freshwater Res.* 33(5):865-880. 1982. SFA 28(2)
[Sch. Environ. Life Sci., Murdoch Univ., Murdoch, W.A. 6150, Australia]

83-000986 Reist, J. D. BEHAVIORAL VARIATION IN PELVIC PHENOTYPES OF BROOK STICKLEBACK, *CULAEA INCONSTANS*, IN RESPONSE TO PREDATION BY NORTHERN PIKE, *ESOX LUCIUS*. *Environ. Biol. Fishes* 8(3-4):255-267. 1 Mar. 1983. SFA 28(2)
[Dep. Ichthyol. Herpetol., R. Ont. Mus., Toronto, ON M5S 2C6, Canada] Populations of *Culaea inconstans*, from Alberta and Saskatchewan, Canada exhibit phenotypic variation in expression of the pelvic skeleton and associated spines, from complete presence (with) through intermediate forms to complete absence (without). Such variation influences predation by *Esox lucius* which prefer the least spiny prey. Behavioral differences were investigated before and during pike predation. These differences may be associated either with the phenotype (with, without) or size of the stickleback (small, medium, large). Univariate differences between the 12 possible groups in mean time spent in various behaviors were due primarily to size (=age) effects and presence or absence of the predator. The groups also exhibited phenotypic differences in multivariate means (centroids) of these behaviors. The phenotypes differed in variation of these behaviors, both univariately and multivariately, and such variation resulted in inappropriate behavior being exhibited when a predator was present. These differences were in a direction to counterbalance morphological effects of spine absence, thus likely assist in the maintenance of the without phenotype in the population.

83-000987 Roberts, D.; E. DeMartini; C. Engel and K. Plummer. A PRELIMINARY EVALUATION OF PREY SELECTION BY JUVENILE-SMALL ADULT CALIFORNIA HALIBUT (*PARALICHTHYS CALIFORNICUS*) IN NEARSHORE COASTAL WATERS OFF SOUTHERN CALIFORNIA. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 214-223. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies, Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000988 Robison, B. H. and T. G. Bailey. NUTRIENT ENERGY FLUX IN MIDWATER FISHES. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 80-87. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies. Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000989 Salmi, J. and E. Ikonen. FOOD AND FEEDING OF SALMON IN THE BOTHNIAN SEA. *Int. Counc. Explor. Sea* C.M. 1982/M:41. 6p. 1982. In English with French summ. SFA 28(2)

FOODS/FEEDING (CONTINUED)

83-000989 CONTINUED
[Finn. Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

83-000990 Simenstad, C. A.; D. M. Eggers; R. C. Wissmar and E. C. Volk. BEYOND GUTS: THE POWERS AND PITFALLS OF EXPERIMENTALLY DOCUMENTING FUNCTIONAL ASPECTS OF FISH FORAGING BEHAVIOR. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 33-46. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies. Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000991 Sorden, C. T. FOOD SPECIALIZATION BY *MULLOIDES FLAVOLINEATUS* (MULLIDAE) AT MIDWAY ISLANDS. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 228-234. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies, Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-000992 Strel'nikova, A. P. and M. N. Ivanova. FEEDING OF SMELT, *OSMERUS EPERLANUS* (OSMERIDAE), IN EARLY ONTOGENESIS IN THE RYBINSK RESERVOIR. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):48-54. 1982. SFA 28(2)
[Inst. Biol. Inland Waters, Acad. Sci. USSR, Borok, Yaroslavl Dist., USSR] The larvae of smelt, *Osmerus eperlanus*, consume only Rotatoria and small Copepoda on changing over to external feeding. At later stages of development they feed on larger Cladocera. Depending on temperature regime and prey population, the feeding intensity and growth of juveniles change. In spring 1979, the earliest larvae were exposed to favorable feeding conditions. They had vigorous feeding and more rapid growth than their remaining cohorts.

83-000993 Wallace, R. K. and J. S. Ramsey. RELIABILITY IN MEASURING DIET OVERLAP. *Can. J. Fish. Aquatic Sci.* 40(3):347-351. Mar. 1983. In English with French summ. SFA 28(2)
[Ala. Coop. Fish. Res. Unit, Swingle Hall, Auburn Univ., Auburn, AL 36849]

83-000994 White, P. N. and M. N. Bruton. FOOD AND FEEDING MECHANISMS OF *GILCHRISTELLA AESTUARIUS* (PISCES: CLUPEIDAE). *S. Afr. J. Zool.* 18(1):31-36. 1983. In English with Afrikaans summ. SFA 28(2)
[Dep. Ichthyol. Fish. Sci., Rhodes Univ., P.O. Box 94, Grahamstown 6140 South Africa] From December 1980 to June 1981 a total of 180 specimens of the estuarine round-herring *Gilchristella aestuarius* were collected for stomach content analysis. Diatoms were the most frequently ingested food item, although the gill raker gap was too large to retain these and other planktonic food items. Mucus-secreting cells within the epithelial layer of the hyoid arch, branchial arches and gill rakers, trap the plankton which accumulate in boluses of mucus-enveloped food too large to pass through the gill rakers. *G. aestuarius* was found to possess a pair of suprabranchial pouches. The histology of the walls of these organs and the external attachment of six muscle blocks indicates a feeding mechanism involving the accumulation and temporary storage of diatoms and other planktonic food items, which are ten coalesced into a pellet large enough to be swallowed by peristalsis into the stomach.

83-000995 Winfield, I. J.; G. Peirson; M. Cryer and C. R. Townsend. THE BEHAVIOURAL BASIS OF PREY SELECTION BY UNDERYEARLING BREAM (*ABRAMIS BRAMA* (L.)) AND ROACH (*RUTILUS RUTILUS* (L.)). *Freshwater Biol.*

FOODS/FEEDING (CONTINUED)

83-000995 CONTINUED 13(2):139-149. Apr. 1983. SFA 28(2)
[Sch. Biol. Sci., Univ. East Anglia, Norwich NR4 7TJ, England] A clear difference in the ability to escape from fish predators exists between members of the Cladocera and Copepoda. The results of our laboratory studies have shown that underyearling roach and bream both found copepods more difficult to capture than cladocerans. However, bream were far more efficient than roach at catching the more elusive copepod prey. The basis for this difference was the greater strike ability of bream, most likely related to its more protrusible mouth. In their natural environment the two species of fish exhibited food resource partitioning with planktonic Cladocera predominating in roach guts and copepods and non-planktonic Cladocera composing the vast majority of the gut contents of bream. Differences in diet are partly due to their contrasting attack abilities. Additional variation may arise because of subtle differences in the timing and location of foraging.

83-000996 Yoklavich, M. GROWTH, FOOD CONSUMPTION, AND CONVERSION EFFICIENCY OF JUVENILE ENGLISH SOLE (*PAROPHRYS VETULUS*). *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 97-105. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies. Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

AGE AND GROWTH

83-000997 Barwick, D. H. and P. R. Moore. ABUNDANCE AND GROWTH OF REDEYE BASS IN TWO SOUTH CAROLINA RESERVOIRS. *Trans. Am. Fish. Soc.* 112(2A):216-219. Mar. 1983. SFA 28(2)
[U.S. FWS, 206 Highway 123 By-Pass, Clemson, SC 29631]

83-000998 Belanger, S. E. and S. R. Hogler. COMPARISON OF FIVE AGEING METHODOLOGIES APPLIED TO WALLEYE (*STIZOSTEDION VITREUM*) IN BURT LAKE, MICHIGAN. *J. Great Lakes Res.* 8(4):666-671. 1982. SFA 28(2)
[Dep. Biol. Sci., Bowling Green State Univ., Bowling Green, OH 43403] Age estimations were performed on 25 walleyes (*Stizostedion vitreum*) from Burt Lake, Michigan, by sectioning pectoral and pelvic fin rays, dorsal fin spines, and otoliths and by impressing scales. Age groups 4 to 11 were found using these methods. Paired t-tests showed no significant differences among all pairs ($p>0.05$), except the pelvic fin ray and otolith combination. Variability exists among the age estimations for individual fishes, however, statistically all methods were of equal precision. A subjective merit analysis showed otoliths and pectoral fin rays had the highest rating, while pelvic fin rays had the lowest. In areas of the Great Lakes which have walleye populations that exhibit similar age patterns as Burt Lake walleye, otolith or pectoral fin ray ageing methods should be used as an occasional check for the reliability of scale age estimations.

83-000999 Boehlert, G. W. ONTOGENETIC CHANGES IN GROWTH AND THEIR RELATIONSHIP WITH TEMPERATURE AND HABITAT CHANGE. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 115-123. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies. Wash. Sea Grant, Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

83-001000 Boehlert, G. W. and M. M. Yoklavich. EFFECTS OF TEMPERATURE, RATION, AND FISH SIZE ON GROWTH OF JUVENILE BLACK ROCKFISH, *SEBASTES MELANOPS*. *Environ. Biol. Fishes* 8(1):17-28. 1 Jan. 1983. SFA 28(2)

AGE AND GROWTH (CONTINUED)

83-001000 CONTINUED

[Sch. Oceanogr., Oreg. State Univ., Newport 97365] Young *Sebastes melanops* live as pelagic larvae and juveniles in offshore waters, recruiting to the nearshore environment at an age of approximately six months. In the summer upwelling season, juveniles may be captured in tidepools and shallow coastal waters, where temperatures may be as low as 8°C, or in shallow estuarine habitats where temperatures reach 18°C. This study was conducted to determine the effects of temperature, ration, and fish size upon growth. Juveniles 35 to 93 mm standard length were acclimated to 7°, 12°, and 18°C and provided four daily rations (nominally 0, 25, 50, and 100% maximum ration); growth and food consumption were monitored over 57 days. Growth in length ranged from -0.023 to 0.314 mm per day, relative growth in weight ranged from 0.689 to 1.495% body weight per day, and gross conversion efficiencies ranged from -13 to 21% among treatments. Under starvaton conditions, weight loss increased with increasing temperature. At rations expressed as percent maximum at a given temperature, growth increased with increasing temperature. Maximum relative ration (% body weight per day), however, decreased with decreasing temperature; at equivalent relative rations, growth did not differ significantly among temperatures. Evacuation rates determined at the experimental temperatures suggest that daily ration is limited by digestion rate and that temperature therefore affects energy turnover. Growth was analyzed with multiple regression models with ration, temperature, and initial weight was independent variables. Relative growth increased with increasing initial weight. The model predicts that relative maintenance rations decrease with increasing size. The percentage of full ration represented by maintenance ration is relatively greater for small fish at low temperatures, suggesting a basis for ontogenetic change in thermal optima for growth. The resulst of this study suggest that thermal environment may have an important effect upon first year growth of juvenile *S. melanops*.

83-001001 Havelka, M.; C. A. Booth; K. G. Whitney and C. E. Whitney. GROWTH AND POPULATION STRUCTURE OF THE MOJAVE CHUB. *Cal-Neva Wildl.* 1982:9-15. 1982. SFA 28(2)

[Desert Res. Stn., Barstow, CA 92311] In an attempt to establish a refugium for the Mojave Chub (*Gila bicolor mohavensis*), sixteen chubs were transplanted from the Fort Soda pond near Baker, California to a 30-square meter pond at the Desert Research Station, 26 km west of Barstow, California. This initial parent stock rapidly established a sizable population within the first year of its introduction. From February, 1981 to January, 1982 the chub population was monitored weekly. A Lincoln-Peterson Index was used to estimate the population of chubs from 4 to 11 cm in size. Two hundred fish were tagged and their lengths and weights were monitored from May, 1981 to January, 1982. The data indicated that the Mojave Chub population ranged from a high of 2516 fish during late summer to a low of 880 during late winter. Chubs gained weight in May, but from June to October lost up to 35% of their body weight. During November the fish again started to gain weight. Possible reasons for summer weight loss are reviewed.

83-001002 Jobling, M. GROWTH STUDIES WITH FISH--OVERCOMING THE PROBLEMS OF SIZE VARIATION. *J. Fish Biol.* 22(2):153-157. Feb. 1983. SFA 28(2)

[Inst. Fiskerifag, Univ. Tromsø, 9001 Tromsø, Norway] The relationship between growth rate and fish size is described by the equation $\log_e G_w = a - 0.4 \log_e W$, where G_w is the specific growth rate and W is fish weight. Since the intercept (a) represents the $\log_e G_w$ of a fish unit size, the relationship presents a method allowing comparison of data from experiments involving fish of different sizes. The application of the method is demonstrated by examining the effects of environmental temperature on growth rates of cod, *Gadus morhua*, and it is suggested that the optimum temperature for growth of cod is 13-15°C.

AGE AND GROWTH (CONTINUED)

83-001003 Johnson, A. G. AGE AND GROWTH OF YELLOWTAIL SNAPPER FROM SOUTH FLORIDA. *Trans. Am. Fish. Soc.* 112(2A):173-177. Mar. 1983. SFA 28(2)
[NMFS, Southeast Fish. Cent., Panama City Lab., 3500 Delwood Beach Rd., Panama City, FL 32407]

83-001004 Kochkin, P. N. STUDY OF AGE AND GROWTH OF PIKE GLASSFISH, *CHAMPSOCEPHALUS GUNNARI (CHANNICHTHYIDAE). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):37-47. 1982. SFA 28(2)
[VNIRO, Moscow, USSR]

83-001005 Kraiem, M. M. ETUDE COMPARATIVE DE L'ÂGE ET DE LA CROISSANCE DU BARBEAU, *BARBUS BARBUS* (L.), [POISSONS, CYPRINIDÉS] DANS DEUX RIVIÈRES FRANÇAISES, LE RHÔNE ET L'ALLIER. [THE AGE AND GROWTH OF THE BARBEL, *BARBUS BARBUS* (L.) IN TWO FRENCH RIVERS, THE RHÔNE AND THE ALLIER: A COMPARATIVE STUDY.] *Arch. Hydrobiol.* 96(1):73-96. 1982. SFA 28(2)
[Dep. Biol. Anim. Ecol., Fac. Sci. Tunis, Tunisia] The Barbel were sampled by electric fishing in two central and eastern French rivers. Their growth was studied by direct back calculation on their scales and their opercular bones. The size of one-year-old specimens was confirmed by the size frequency histograms. When sexes are considered separately, growth is found to be more rapid in females than in males. Some specimens were captured which were over 20 years old. The length and growth rates were similar in the Rhône and the Allier rivers, but inferior to those recorded from England, Belgium and Rumania. The age structure of the populations makes fluctuations in the yearly recruitement apparent. These fluctuations are great in the Rhône, where they seem to vary according to the summer temperature and, to a lesser degree, according to the summer discharge of the river.

83-001006 McKay, L. R. A GENETIC ANALYSIS OF GROWTH IN RAINBOW TROUT *(SALMO GAIRDNERI). Ph.D. dissertation, Univ. Guelph (Canada)* 1982. From Diss. Abstr. Int. B Sci. Eng. 43(8):2400. Feb. 1983. SFA 28(2)
Genetic parameters for growth and carcass composition were estimated using two strains of rainbow trout (*Salmo gairdneri*) and their F_1 and F_2 hybrids. For one strain, paternal half-sib estimates of heritability ranged from 0.1 to 0.3 for fry size and 0.1 to 0.2 for yearling size. Full-sib estimates of heritability differed for the two strains for both yearling and two-year-old size traits, possibly because of strain differences in age of maturation or smoltification. Maternal effects decreased with age for fry traits, becoming less important than addivive genetic influences eight weeks after the initiation of feeding. Maternal effects and non-additive genetic effects were essentially absent at the yearing stage. Dried egg weight was possitively correlated with fry size, but was not significantly correlated with growth rates ($P<.05$). Fry size or growth was not correlated with yearling size or growth, indicating that early selection would not be effective in improving size at later ages. One pure strain was generally superior to the other for growth, but this superiority was only significiant at the 2-year-old stage. This superiority was due to additive genetic effects, as maternal influences favoured the inferior strain. Some heterosis was apparent for the strain crosses, but it was insufficient to allow the cross breds to surpass the best parental strain in performance. When fish were grown at high (15°C) and low (7°C) temperatures, family x temperature interactions were apparent for gain in forklength, but not for carcass traits (percent moisture and percent lipid). Carcass traits showed no significant effects of family or temperature. The results of this study indicate that growth will respond to selection and that the development of temperature-specific strains will be necessary for the optimal improvement of growth. Carcass composition was not correlated with growth, so it should be unaffected by selection for growth. Competition studies revealed that the genotype of a fish influences its size and growth to a greater extent than the genotype of competing fish. Thus, fish can be evaluated in groups without unduly affecting their performance.

AGE AND GROWTH (CONTINUED)

83-001007 Merrick, J. R.; S. H. Midgley and M. A. Rimmer. PRELIMINARY STUDIES ON GROWTH OF TWO SPOTTED BARRAMUNDI SPECIES, *SCLEROPAGES LEICHARDTI* AND *S. JARDINI* (PISCES: OSTEOGLOSSIDAE). *Aquaculture* 32(1-2):195-199. Apr. 1983. SFA 28(2)

[Sch. Biol. Sci., Macquarie Univ., North Ryde, N.S.W. 2113, Australia]

83-001008 Oni, S. K.; J. Y. Olayemi and J. D. Adegboye. COMPARATIVE PHYSIOLOGY OF THREE ECOLOGICALLY DISTINCT FRESHWATER FISHES, *ALESTES NURSE* RUPPELL, *SYNODONTIS SCHALL* BLOCH & SCHNEIDER AND *TILAPIA ZILLII* GERVAIS. *J. Fish Biol.* 22(1):105-109. Jan. 1983. SFA 28(2)

[Nigerian Military Sch., Zaria, Nigeria] There are species differences in the physiological robustness of *Alestes nurse*, *Synodontis schall* and *Tilapia zillii*. The values of coefficient of condition in the *Alestes* sp., *Synodontis* sp. and *Tilapia* sp. were 1.74, 2.48 and 3.6 respectively. *Tilapia zillii* was significantly more robust than any of the other two species ($P<0.02$).

83-001009 Parsons, G. R. AN EXAMINATION OF THE VERTEBRAL RINGS OF THE ATLANTIC SHARPNOSE SHARK, *RHIZOPRIONODON TERRAENOVAE*. *Northeast Gulf Sci.* 6(1):63-66. Feb. 1983. SFA 28(2)

[Dep. Mar. Sci., Univ. South Fla., St. Petersburg 33701]

83-001010 Petrere, M., Jr. YIELD PER RECRUIT OF THE TAMBAQUI, *COLOSSOMA MACROPOMUM* CUVIER, IN THE AMAZONAS STATE, BRAZIL. *J. Fish Biol.* 22(2):133-144. Feb. 1983. SFA 28(2)

[Inst. Nac. Pesquisac Amazonia, C.P. 478, 69000-Manaus (AM), Brazil] The tambaqui, *Colossoma macropomum*, is the most important fish landed at Manaus by the fishery in the Amazonas State, Brazil. Population parameters have been estimated for this stock, which are: $L\infty=107.3$ cm(T.L.), $W\infty=32$kg, $K=0.227$ year^{-1}, $M=0.45$ year^{-1}. A yield per recruit analysis shows that the stock is underexploited for values of M bigger than 0.30 year^{-1}.

83-001011 Petursson, P. M. and R. Rosenberg. MATURITY AND GROWTH OF THE SPRING SPAWNING HERRING IN THE KATTEGAT-SKAGERRAK. *Ophelia* 21(2):195-204. Dec. 1982. SFA 28(2)

[Inst. Mar. Res., Lysekil, Sweden] The two main indigenous herring (*Clupea harengus* L.) stocks in the Skagerrak and the Kattegat, the Skagerrak Spring Spawners (SSS) and the Kattegat Spring Spawners (KSS) have been studied regarding percentage number spawning at age, biomass and length increment, and gonad maturity cycle for the years 1969, 1971 and 1973-1976. The SSS were significantly ($p<0.01$) longer and had a larger biomass at a fixed age than the KSS. Both stocks showed a strong seasonal variation in biomass with minimum in the first quarter and maximum normally in the third quarter of the year. The maturation cycle was different between the sexes: the recruited males of both stocks passed the winter in pre-maturity Stage IV, whereas the gonads of the females successively developed from Stage III to Stage IV during that time. The proportion of females and males were similar in both stocks. Normally, a small percentage of both stocks spawned at 2 years of age, but in 1971 it was 20%. Almost all of the SSS spawned at 3 years of age and older, whereas among the KSS the percentage of non-spawners at the age of 3 years varied between 6 and 46 between years. There seem to be good and bad years with respect to spawning, especially among the KKS. The recruitment of 2 and 3 years old herring to the spawning stock could not be related to fish length, and it is hypothesized that rather a critical fat level has to be reached and maintained for some time for a subsequent successful gonad development of spring spawners. Different strategies for gonad development of spring spawners, summer spawners, autumn spawners and winter spawners are briefly discussed. Based on biological consideration it is suggested that spring spawning herring should preferably be fished in the second half of the year.

AGE AND GROWTH (CONTINUED)

83-001012 Protopopov, N. K. GROWTH AND MATURATION OF SEMIMIGRATORY VOLKHOV WHITEFISH, *COREGONUS LAVARETUS PIDSCHIAN* (SALMONIDAE), OF THE PECHORA RIVER. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):29-36. 1982. SFA 28(2)

[PINRO, Arkhangel'sk, USSR] The growth rate of the Volkov whitefish, *Coregonus lavaretus pidschian* changes during different life stages. A relationship exists between sexual maturation and length and weight. Most mature at 310-360 mm and 400-700 g. Due to great variability in growth rate the age of first, sexual maturation varies from age 5 to 10. The "Lee phenomenon" with back calculation of growth on the basis of scales is discussed.

83-001013 Tsuji, S. and T. Aoyama. DAILY GROWTH INCREMENTS OBSERVED IN OTOLITHS OF THE LARVAE OF JAPANESE RED SEA BREAM *PAGRUS MAJOR* (TEMMINCK ET SCHLEGEL). *Bull. Jpn. Soc. Sci. Fish.* 48(11):1559-1562. Nov. 1982. SFA 28(2)

[Ocean Res. Inst., Univ. Tokyo, Minamidai, Nakano, Tokyo 164, Japan] The presence of daily growth increments, initiated just after hatching, are described in the otoliths of reared Japanese red sea bream *Pagrus major* (Temminck et Schlegel). Counts deviate within the range of 30% of the mean and the coefficient of deviation varies 6% to 10%. Since there is no significant correlation between the number of increments and the standard length within age groups, it may be concluded that formation of daily increments and the otolith is independent of the growth rate of fish. There is no significant difference between counts of increments made on right and left otoliths. Daily increments in the otoliths of field-collected larvae are clearer and easier to count than those of reared ones. Since the main cause of counting error results from the difficulty in distinguishing daily increments accurately, the error in ageing field-collected samples may be smaller than in ageing reared ones.

83-001014 Tsukamoto, M.; T. Onohara; K. Ushirogawa and S. Matsuura. [STUDY ON AGE CHARACTERS OF THE MUD SKIPPER *BOLEOPHTHALMUS CHINENSIS*.] *Bull. Jpn. Soc. Sci. Fish.* 49(1):69-74. Jan. 1983. In Japanese with English summ. SFA 28(2)

[Dep. Fish., Fac. Agric., Kyushu Univ., Hakozaki, Higachi, Fukuoka 812, Japan] The mud skipper *Boleophthalmus chinensis* is an amphibious fish. In Japan, its distribution is limited only to the inner part of the Ariake Sea and a part of Yatsushiro Bay. The present study was aimed at selecting the most suitable age character for age determination of this species from among the pectoral radials, coracoid, pelvic girdle, scale, otolith, and vertebrae. The marks of the pectoral radials, coracoid, and pelvic girdle were prominent enough to make age determination, while those of the scale, otolith, and vertebrae were obscure. Among the former three characters, the center of mark-forming (focus) was observable most clearly in the size and pectoral radials, particularly in the 2nd one. All eight pectoral radials from same individual showed good correlation between their mark-size and their radian size. The relationship between the 2nd pectoral radial-size (R:mm) and the total length (TL: mm) was expressed by the follwing equation; R=0.023 TL-0.135 r=0.987. There fore, the 2nd pectoral radial was the most suitable age character of the mud skipper.

83-001015 Zimmerer, E. J. EFFECT OF SALINITY ON THE SIZE-HIERARCHY EFFECT IN *POECILIA LATIPINNA, P. RETICULATA* AND *GAMBUSIA AFFINIS*. *Copeia* 1983(1):243-245. 10 Feb. 1983. SFA 28(2)

[Osborn Lab. Mar. Sci., N.Y. Zool. Soc., Boardwalk at West Eighth St., Brooklyn, NY 11224]

GEOGRAPHICAL DISTRIBUTION, FISH SURVEYS, ETC.

83-001016 Acero P., A. COMENTARIOS PRELIMINARES SOBRE LOS CLINIDOS (TELEOSTEI: PERCIFORMES: CLINIDAE) DEL CARIBE COLOMBIANO. [PRELIMINARY COMMENTS ON THE CLINIDS (TELEOSTEI: PERCIFORMES: CLINIDAE) OF CARIBBEAN COLOMBIA.] *An. Inst. Invest. Mar. Punta Betin* 11:59-70. 1979. In Spanish with English summ. SFA 28(2)
[INVEMAR, Ap. Aéreo 1016, Santa Maria, Colombia]

83-001017 Behnke, R. J. and D. E. Benson. ENDANGERED AND THREATENED FISHES OF THE UPPER COLORADO RIVER BASIN. *Colo. State Univ. Coop. Ext. Serv. Bull.* 503A. 34p. Feb. 1983. Available at no cost from Ext. Serv. Bull., Room 171, Aylesworth Hall, CSU, Fort Collins, CO 80523. SFA 28(2)
This is a revision of the 1980 publication by the same name.

83-001018 Branstetter, S. and J. D. McEachran. A FIRST RECORD OF THE BIGEYE THRESHER, *ALOPIAS SUPERCILIOSUS*, THE BLUE SHARK, *PRIONACE GLAUCA*, AND THE PELAGIC STINGRAY, *DASYATIS VIOLACEA*, FROM THE GULF OF MEXICO. *Northeast Gulf Sci.* 6(1):59-61. Feb. 1983. SFA 28(2)
[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station 77843]

83-001019 Castro-Aguirre, J. L. and A. Marquez-Espinoza. CONTRIBUCION AL CONOCIMIENTO DE LA ICTIOFAUNA DE LA ISLA DE LOBOS Y ZONAS ADYACENTES. VERACRUZ, MEXICO. [CONTRIBUTION TO A KNOWLEDGE OF THE ICHTHYOFAUNA OF THE ISLE OF LOBOS AND ADJACENT ZONES. VERA CRUZ, MEXICO.] *Mex. Dep. Pesca Ser. Cient.* No. 22. viii + 85p. 1981. In Spanish with English summ. SFA 28(2)
[Dep. Hidrobiol., Univ. Autónoma Metro-Unidad Iztopolaga, Mexico 13, D.F.]

83-001020 Castro, J. I. THE SHARKS OF NORTH AMERICAN WATERS. *W.L. Moody, Jr. Nat. Hist. Ser.* No. 5. 180p. 1983. Available from Tex. A&M Univ. Press, Drawer C, College Station 77843. SFA 28(2)

83-001021 Choi, K. and S. Jeon. STUDIES ON THE DISTRIBUTION OF THE FRESH-WATER FISHES IN ISLANDS IN KOREA. *Bull. Korean Assoc. Conserv. Nat.* 2:119-136. 1980. In Korean with English summ. SFA 28(2)
[Korean Inst. Fresh-Water Biol., Seoul, Korea]

83-001022 Choi, K. STUDIES ON THE FRESH-WATER FISH FAUNA IN THE SUDONG RIVER. *Bull. Korean Assoc. Conserv. Nat.* 3:241-267. 1981. In Korean with English summ. SFA 28(2)
[Korean Inst. Fresh-Water Biol., Seoul, Korea]

83-001023 Deehr, R.; B. Owen and F. L. Snyder. PRELIMINARY INVESTIGATIONS OF THE USE OF OLD WOMAN CREEK ESTUARY BY LAKE ERIE FISHES. *Ohio J. Sci.* 83(2):5. Apr. 1983. Abstract only. SFA 28(2)
[Old Woman Creek Natl. Estuarine Sanctuary, 2514 Cleveland Rd. East, Huron, OH]

83-001024 Donohue, K.; P. Edsall; J. Robins and R. Tregonning. EXPLORATORY FISHING FOR SPANISH MACKEREL IN WATERS OFF WESTERN AUSTRALIA DURING THE PERIOD JUNE 16 TO OCTOBER 16, 1981. *West. Aust. Dep. Fish. Wildl. Rep.* No. 57. 46p. 1982. SFA 28(2)
[Dep. Fish. Wildl., 108 Adelaide Terrace, Perth, W.A., Australia]

GEOGRAPHICAL DISTRIBUTION, FISH SURVEYS, ETC. (CONTINUED)

83-001025 Flores-Coto, C.; F. Barba-Torres and J. Sánchez-Robles. SEASONAL DIVERSITY, ABUNDANCE, AND DISTRIBUTION OF ICHTHYOPLANKTON IN TAMIAHUA LAGOON, WESTERN GULF OF MEXICO. *Trans. Am. Fish. Soc.* 112(2B):247-256. Mar. 1983. SFA 28(2)
[Inst. Cienc. Mar. Limnol., Univ. Nac. Autonoma Mexico, A.P. 70-305, Mexico D.F. 04510]

83-001026 Golani, D. and A. Ben-Tuvia. FIRST RECORDS OF THE INDO-PACIFIC DAGGERTOOTH PIKE-CONGER, *MURAENESOX CINEREUS*, IN THE EASTERN MEDITERRANEAN AND IN THE GULF OF ELAT (GULF OF 'AQABA). *Isr. J. Zool.* 31(1-2):54-57. 1982. SFA 28(2)
[Dep. Zool., Hebrew Univ. Jerusalem, Jerusalem 91904, Israel]

83-001027 Grall, C.; D. P. de Sylva and E. D. Houde. DISTRIBUTION, RELATIVE ABUNDANCE, AND SEASONALITY OF SWORDFISH LARVAE. *Trans. Am. Fish. Soc.* 112(2B):235-246. Mar. 1983. SFA 28(2)
[Rosenstiel Sch. Mar. Atmos. Sci., Univ. Miami, 4600 Rickenbacker Causeway, Miami, FL 33149]

83-001028 Guillory, V. FISHES OF THE LOWER MISSISSIPPI RIVER NEAR ST. FRANCISVILLE, LOUISIANA. *Proc. La. Acad. Sci.* 45:108-121. 1982. SFA 28(2)
[La. Dep. Wildl. Fish., P.O. Box 37, Grand Isle 70358]

83-001029 Hamada, K. A LUMPSUCKER, *EUMICROTREMUS BIRULAI*, CAUGHT IN THE GULF OF ALASKA. *Bull. Fac. Fish. Hokkaido Univ.* 33(4):201-205. 1982. SFA 28(2)
[Lab. Embryol. Genet., Fac. Fish., Hokkaido Univ., Japan]

83-001030 Hardy, G. S. FIRST PACIFIC RECORDS OF *PELAGOCEPHALUS MARKI* HEEMSTRA & SMITH (TETRAODONTIFORMES: TETRAODONTIDAE), AND FIRST MALE SPECIMEN OF THE GENUS. *N.Z. J. Zool.* 9(3):377-380. 1982. SFA 28(2)
[Natl. Mus. N.Z., Private Bag, Wellington, New Zealand]

83-001031 Köster, F. OBSERVACIONES DE LA ICTIOFAUNA DE LAS ISLAS DEL ROSARIO. [OBSERVATIONS ON THE ICHTHYOFAUNA OF THE ISLES OF ROSARIO.] *An. Inst. Invest. Mar. Punta Betin* 11:49-57. 1979. In Spanish. SFA 28(2)
[INVEMAR, Ap. Aéro 1016, Santa Maria, Colombia]

83-001032 Kihara, K. STRUCTURES OF THE BENTHIC SPECIES COMMUNITIES AND THEIR VARIATIONS IN THE EASTERN BERING SEA. *Bull. Jpn. Soc. Sci. Fish.* 49(1):41-47. Jan. 1983. SFA 28(2)
[Tokyo Univ. Fish., 5-7, Konan-4, Minato, Tokyo 108, Japan] The recurrent groups were analyzed in order to clarify the mean pattern of the benthic species communities in the eastern Bering Sea during the summers from 1966 to 1977 excluding 1972 and to elucidate the variations of these communities during the summers from 1966 to 1971 excluding 1969. The mutual affinities between *L. aspera*, *T. chalcogramma*, *G. macrocephalus* and *P. quadrituberculatus* were great and stable through these summers of five years. These species groups were defined as the core species group of the benthic species communities in the central region of this continental shelf. The structures of these communities are considered to be formed and to change according to the stable and the unstable relations between the species and the core species group.

GEOGRAPHICAL DISTRIBUTION, FISH SURVEYS, ETC. (CONTINUED)

83-001033 Kim, Y. U. and S. Y. Hong. FISH FAUNA OF THE NAG-DONG RIVER ESTUARY. *Bull. Korean Assoc. Conserv. Nat.* 2:137-146. 1980. In Korean with English summ. SFA 28(2)
[Natl. Fish. Univ. Busan, Korea]

83-001034 Korean Association for Conservation of Nature, Inc. [RARE AND ENDANGERED SPECIES OF ANIMALS AND PLANTS OF REPUBLIC OF KOREA.] *Korean Assoc. Conserv. Nat., Inc.* 293p. 1981. In Korean with English summ. SFA 28(2)

83-001035 Marley, R. D. SPATIAL DISTRIBUTION PATTERNS OF PLANKTONIC FISH EGGS IN LOWER MOBILE BAY, ALABAMA. *Trans. Am. Fish. Soc.* 112(2B):257-266. Mar. 1983. SFA 28(2)
[Dep. Biol., Univ. South Ala., Mobile 36688]

83-001036 O'Gorman, R. DISTRIBUTION AND ABUNDANCE OF LARVAL FISH IN THE NEARSHORE WATERS OF WESTERN LAKE HURON. *J. Great Lakes Res.* 9(1):14-22. 1983. SFA 28(2)
[U.S. FWS, Oswego Biol. Stn., 17 Lake St., Oswego, NY 13126] Ichthyoplankton was collected at 17 nearshore (bottom depth $\geq$5m but $\leq$10m) sites in western Lake Huron during 1973-75 with a 0.5-m net of 351-micron mesh towed at 99 m/min. Larvae of rainbow smelt (*Osmerus mordax*) dominated late spring and early summer catches and larvae of alewives (*Alosa pseudoharengus*) the midsummer catches. Larval yellow perch (*Perca flavescens*) were caught in early summer but were rarely the dominant species. The time of spawning and hatching, and thus occurrence of larvae, differed between areas but was less variable for alewives than for yellow perch. The appearance of larvae in Saginaw Bay was followed successivly by their appearance in southern, central, and northern Lake Huron. Rainbow smelt were most abundant in northern Lake Huron and yellow perch and alewives in inner Saginaw Bay. Densities of either rainbow smelt or alewives occasionally exceeded $1/m^3$, whereas those of yellow perch never exceeded $0.1/m^3$. Abundance of alewives was usually highest 1 to 3 m beneath the surface and that of rainbow smelt 2 to at least 6 m beneath the surface. Important nursery areas of rainbow smelt were in bays and off irregular coastlines and those of yellow perch were in bays. All nearshore waters seemed equally important as nursery areas of alewives.

83-001037 Ochman, S. and J. Dodson. COMPOSITION AND STRUCTURE OF THE LARVAL AND JUVENILE FISH COMMUNITY OF THE EASTMAIN RIVER AND ESTUARY, JAMES BAY. *Nat. Can. (Que.)* 109(4):803-813. Dec. 1982. In English with French summ. SFA 28(2)
[Dep. Biol., Univ. Larval, PQ G1K 7P4, Canada] The larval and juvenile fish community of the lower Eastmain river and estuary (James Bay) was highly structured both temporally by date of hatching and spatially by salinity. Community structure throughout the ice-free period is discussed as a function of the pelagic and/or demersal behaviour of larvae after hatching, their transport by currents and the degree to which each species is euryhaline. The major short term effect of the diversion of the Eastmain River was a transport of larvae characteristic of the bay into the river zone.

83-001038 Pennington, C. H.; G. J. Dahl and H. L. Schramm, Jr. OCCURRENCE OF THE RAINBOW SMELT IN THE LOWER MISSISSIPPI RIVER. *J. Miss. Acad. Sci.* 27:41-42. 1982. SFA 28(2)
[USAE Waterways Exp. Stn., Vicksburg, MS 39180]

83-001039 Penrith, M. J. NOTES ON MARINE FISHES COLLECTED IN THE VICINITY OF BOSLUISBAAI. *Madoqua* 13(2):159-168. 1982. SFA 28(2)
[State Mus., Windhoek, South West Africa] Short notes are given on 37

GEOGRAPHICAL DISTRIBUTION, FISH SURVEYS, ETC. (CONTINUED)

83-001039 CONTINUED species of fish collected from the northernmost part of the Skeleton Coast Park. The majority of the fish were of Atlantic warm water origin, with a smaller number of southern African endemics. Of the 37 species, eight were cartilaginous fish and 29 teleosts. Of the latter, 19 were collected in the sea, six from the Kunene River mouth, and four from both habitats.

83-001040 Pezold, F. L. and R. J. Edwards. ADDITIONS TO THE TEXAS MARINE ICHTHYOFAUNA, WITH NOTES ON THE RIO GRANDE ESTUARY. *Southwest. Nat.* 28(1):102-105. 18 Feb. 1983. SFA 28(2)
[Dep. Zool., Univ. Tex., Austin 78712]

83-001041 Sylvester, J. R. and J. D. Broughton. DISTRIBUTION AND RELATIVE ABUNDANCE OF FISH IN POOL 7 OF THE UPPER MISSISSIPPI RIVER. *N. Am. J. Fish. Manage.* 3(1):67-71. 1983. SFA 28(2)
[U.S. FWS, Natl. Fish. Res. Lab., P.O. Box 818, La Crosse, WI 54601]

83-001042 Tokranov, A. M. DISCOVERY OF PACIFIC SAURY *COLOLABIS SAIRA* (SCOMBERESOCIDAE) IN THE KRONOTSKIY GULF (KAMCHATKA). *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):154-155. 1982. SFA 28(2)
[KoTINRO, Petropavlovsk-Kamchatskiy, USSR]

83-001043 Tzeng, W. and O. Tabeta. FIRST RECORD OF THE SHORT-FINNED EEL *ANGUILLA BICOLOR PACIFICA* ELVERS FROM TAIWAN. *Bull. Jpn. Soc. Sci. Fish.* 49(1):27-32. Jan. 1983. SFA 28(2)
[Dep. Zool., Coll. Sci., Natl. Taiwan Univ., Taipei, Taiwan, ROC]

ABUNDANCE, FACTORS OF; SURVIVAL AND MORTALITY

83-001044 Bain, M. B. and L. A. Helfrich. ROLE OF MALE PARENTAL CARE IN SURVIVAL OF LARVAL BLUEGILLS. *Trans. Am. Fish. Soc.* 112(1):47-52. Jan. 1983. SFA 28(2)
[Mass. Coop. Fish. Res. Unit, Univ. Mass., Amherst 01003]

83-001045 McAda, C. W. COLORADO SQUAWFISH, *PTYCHOCHEILUS LUCIUS* (CYPRINIDAE), WITH A CHANNEL CATFISH, *ICTALURUS PUNCTATUS* (ICTALURIDAE), LODGED IN ITS THROAT. *Southwest. Nat.* 28(1):119-120. 18 Feb. 1983. SFA 28(2)
[U.S. FWS, 551 25.5 Rd., Suite B113, Grand Junction, CO 81501]

83-001046 Meefe, G. K.; D. A. Hendrickson; W. L. Minckley and J. N. Rinne. FACTORS RESULTING IN DECLINE OF THE ENDANGERED SONORAN TOPMINNOW *POECILIOPSIS OCCIDENTALIS* (ATHERINIFORMES: POECILIIDAE) IN THE UNITED STATES. *Biol. Conserv.* 25(2):135-159. Feb. 1983. SFA 28(2)
[Dep. Zool., Ariz. State Univ., Tempe 85287] The endangered Sonoran topminnow *Poeciliopsis occidentalis* has steadily declined in distribution and abundance in the past several decades, and currently survives in the United States only in several isolated localities in southern Arizona. This reduction is correlated with, and primarily attributed to, habitat destruction, and introduction and establishment of mosquitofish *Gambusia affinis* and other exotic fishes. Topminnows have characteristically been reduced in number or replaced within a year or two of introduction of

ABUNDANCE, FACTORS OF; SURVIVAL AND MORTALITY (CONTINUED)

83-001046 CONTINUED non-native fishes. Other native fishes have experienced similar declines after introduction of exotics, and much of the endemic western ichtyofauna may be vulnerable to extirpation in this manner. Predation by introduced fishes on natives appears to be a likely mechanism of replacement.

IDENTIFICATION, KEYS, CLASSIFICATION

83-001047 Almaça, C. RE-EXAMINATION OF THE TYPES OF *BARBUS HAASI* MERTENS 1924. *Senckenbergiana Biol.* 63(1-2):33-38. 20 Jan. 1983. In English with German summ. SFA 28(2)
[Mus. Bocage Cent. Fauna Portuguesa, Fac. Cienc., Rua Escola Politéch., P-1294 Lisboa Cedex, Portugal]

83-001048 Arratia F., G. A REVIEW OF FRESHWATER PERCOIDS FROM SOUTH AMERICA (PISCES, OSTEICHTHYES, PERCIFORMES, PERCICHTHYIDAE, AND PERCILIIDAE). *Abh. Senckenb. Naturforsch. Ges.* 540:1-52. 15 Sept. 1982. In English with German summ. SFA 28(2)
[Mus. Nat. Hist., Lawrence, KS 66045]

83-001049 Ayling, A. M. and J. R. Paxton. *ODAX CYANOALLIX*, A NEW SPECIES OF ODACID FISH FROM NORTHERN NEW ZEALAND. *Copeia* 1983(1):95-101. 10 Feb. 1983. SFA 28(2)
[Mar. Res. Found., PMB1, Daintree, Queensland 4873, Australia]

83-001050 Banarescu, P. M.; T. T. Nalbant and M. Goren. THE NEOMACHEILINE LOACHES FROM ISRAEL (PISCES: COBITIDAE: NOEMACHEILINAE). *Isr. J. Zool.* 31(1-2):1-25. 1982. SFA 28(2)
[Inst. Stiinte Biol., Spl. Independentei nr. 296, 77748 Bucuresti, Romania]

83-001051 Burgess, W. E. *CORYDORAS ROBINEAE*, A NEW SPECIES OF CALLICHTHYID CATFISH FROM BRAZIL. *Trop. Fish Hobbyist* 31(9):42-43. May 1983. SFA 28(2)

83-001052 Burr, B. M. and W. W. Dimmick. REDESCRIPTION OF THE BIGEYE SHINER, *NOTROPIS BOOPS* (PISCES: CYPRINIDAE). *Proc. Biol. Soc. Wash.* 96(1):50-58. 25 Mar. 1983. SFA 28(2)
[Dep. Zool., South. Ill. Univ., Carbondale 62901]

83-001053 Burr, B. M. and R. C. Cashner. *CAMPOSTOMA PAUCIRADII*, A NEW CYPRINID FISH FROM SOUTHEASTERN UNITED STATES, WITH A REVIEW OF RELATED FORMS. *Copeia* 1983(1):101-116. 10 Feb. 1983. SFA 28(2)
[Dep. Zool., South. Ill. Univ., Carbondale, IL 62901]

83-001054 Caruso, J. H. THE SYSTEMATICS AND DISTRIBUTION OF THE LOPHIID ANGLERFISHES: II. REVISIONS OF THE GENERA *LOPHIOMUS* AND *LOPHIUS*. *Copeia* 1983(1):11-30. 10 Feb. 1983. SFA 28(2)
[Dep. Biol., Lafayette Coll., Easton, PA 18042]

IDENTIFICATION, KEYS, CLASSIFICATION (CONTINUED)

83-001055 Chu, X. and Y. Chen. [A NEW GENUS AND SPECIES OF BLIND CYPRINID FISH FROM CHINA WITH SPECIAL REFERENCE TO ITS RELATIONSHIPS.] *Acta Zool. Sin.* 28(4):383-388. 1982. In Chinese with English summ. SFA 28(2)
[Kunming Inst. Zool., Acad. Sin., China]

83-001056 Ciying, Z.; C. Yinrui and H. Shunyou. [THE HOMALOPTERID FISHES FROM YUNNAN PROVINCE, CHINA.] *Zool. Res.* 3(4):393-402. 1982. In Chinese with English summ. SFA 28(2)
[Dep. Biol., Jinan Univ., China]

83-001057 Franz, R. and G. H. Burgess. A NEW PEOCILIID KILLIFISH, *LIMIA RIVASI*, FROM HAITI. *Northeast Gulf Sci.* 6(1):51-54. Feb. 1983. SFA 28(2)
[Fla. State Mus., Univ. Fla., Gainesville 32611]

83-001058 Fuiman, L. A.; J. V. Conner; B. F. Lathrop; G. L. Buynak; D. E. Snyder and J. J. Loos. STATE OF THE ART OF IDENTIFICATION OF CYPRINID FISH LARVAE FROM EASTERN NORTH AMERICA. *Trans. Am. Fish. Soc.* 112(2B):319-332. Mar. 1983. SFA 28(2)
[Sch. Nat. Resour., S.T. Dana Bldg., Univ. Mich., Ann Arbor 48109]

83-001059 Geevarghese, C. and P. A. John. A NEW GOBY, *GLOSSOGOBIUS MINUTUS* (TELEOSTEI: GOBIIDAE) FROM THE SOUTH-WEST COAST OF INDIA. *J. Fish Biol.* 22(2):231-240. Feb. 1983. SFA 28(2)
[Dep. Aquatic Biol. Fish., Univ. Kerala, Aquarium Campus, Trivandrum-7, Kerala, India]

83-001060 Gerlach, J. M. CHARACTERS FOR DISTINGUISHING LARVAE OF CARP, *CYPRINUS CARPIO*, AND GOLDFISH, *CARASSIUS AURATUS*. *Copeia* 1983(1):116-121. 10 Feb. 1983. SFA 28(2)
[198 Lucky Hill Rd., West Chester, PA 19380] Larvae of carp, *Cyprinus carpio*, and goldfish, *Carassius auratus*, were compared to determine a rapid and accurate method to separate the species. Eggs and larvae from the Schuylkill River, Pennsylvania, and the Potomac River, Maryland, were reared through the metalarval phase. Additional specimens were collected from the Schuylkill drainage. Similar results were obtained for laboratory-reared and field-collected specimens of each species from both rivers. The most reliable characteristic for distinguishing the two species was the preanal myomere count. Carp had about 22 or 23 (range: 21-24) entire myomeres anterior to the posterior margin of the vent while goldfish had only about 18 or 19 (range: 17-20). The total myomere count, which approximated the vertebra count (about 36-40 in carp and 29-32 in goldfish), also exhibited a similar difference between species but with a slight overlap in range, probably due to difficulty in discerning the most posterior myomeres of some specimens. Pigmentation differences in the head region of protolarvae and mesolarvae were subtle but useful. The anterior end of the upper branch of the "Y" pigment line extended slightly beyond the anterior rim of the auditory vesicle in goldfish but usually terminated at the anterior rim of the vesicle in carp. In metalarvae, the premaxilla was consistantly below eye level in carp and at about mid-eye level in goldfish.

83-001061 Goren, M. *QUISQUILIUS FLAVICAUDATUS*, A NEW GOBIOID FISH FROM THE CORAL REEFS OF THE RED SEA. *Zool. Meded. Rijksmus. Nat. Hist. Leiden* 56(11):139-142. 7 May 1982. SFA 28(2)
[Zool. Dep., Tel Aviv Univ., Tel Aviv, Israel]

IDENTIFICATION, KEYS, CLASSIFICATION (CONTINUED)

83-001062 Goren, M. and I. Karplus. *TOMIYAMICHTHYS RANDALLI* N. SP., A GOBIID ASSOCIATED WITH A SHRIMP, FROM THE RED SEA. *Senckenbergiana Biol.* 63(1-2):27-31. 20 Jan. 1983. SFA 28(2)
[Dep. Zool., Tel Aviv Univ., Tel Aviv 69978, Israel]

83-001063 Hecht, T. ON THE ENIGMATIC SAGITTAL OTOLITHS AND THE SYSTEMATIC POSITION OF THE TELEOSTEAN GENERA *ADIORYX*, *HOLOCENTRUS* AND *FLAMMEO* (BERYCIFORMES: HOLOCENTRIDAE). *Isr. J. Zool.* 31(1-2):39-46. 1982. SFA 28(2)
[Dep. Ichthyol. Fish. Sci., Rhodes Univ., Grahamstown, South Africa]

83-001064 Hollerman, W. THREE NEW SPECIES AND A NEW GENUS OF TRIPTERYGIID FISHES (BLENNIOIDEI) FROM THE INDO-WEST PACIFIC OCEAN. *Ann. Cape Prov. Mus. Nat. Hist.* 14(4):109-137. 29 Oct. 1982. SFA 28(2)
[Albany Mus., Grahamstown, South Africa]

83-001065 Isbrücker, I. J. H. and H. Nijssen. NEW DATA ON *METALORICARIA PAUCIDENS* FROM FRENCH GUIANA AND SURINAM (PISCES, SILURIFORMES, LORICARIIDAE). *Bijdr. Dierkd.* 52(2):155-168. 1982. In English with French summ. SFA 28(2)
[Inst. Taxon. Zool., Univ. Amsterdam, P.O. Box 20125, 1000 HC Amsterdam, Netherlands]

83-001066 Johnson, R. K. and D. W. Greenfield. CLINGFISHES (GOBIESOCIDAE) FROM BELIZE AND HONDURAS, CENTRAL AMERICA, WITH A REDESCRIPTION OF *GOBIESOX BARBATULUS* STARKS. *Northeast Gulf Sci.* 6(1):33-49. Feb. 1983. SFA 28(2)
[Dep. Zool., Field Mus. Nat. Hist., Chicago, IL 60605]

83-001067 Lauder, G. V. and K. F. Liem. THE EVOLUTION AND INTERRELATIONSHIPS OF THE ACTINOPTERYGIAN FISHES. *Bull. Mus. Comp. Zool.* 150(3):95-197. 3 Mar. 1983. SFA 28(2)
[Dep. Anat., Univ. Chicago, 1025 E. 57th St., Chicago, IL 60637] The phylogenetic relationships of ray-finned fishes are critically reviewed, and major features in the evolution of actinopterygian fishes are discussed and summarized. Significant progress has been made over the last fifteen years in defining the interrelationships of ray-finned fishes, but much of this progress has not been widely noted, especially by experimental biologists. Several currently accepted higher taxa are only poorly defined (e.g., the Acanthopterygii) while others are not corroborated by any uniquely derived features (the Protacanthopterygii and Paracanthopterygii). These taxa exemplify areas in need of reexamination by systematic ichthyologists.

83-001068 Mochioka, N.; S. Kakuda and O. Tabeta. CONGRID LEPTOCEPHALI IN WESTERN NORTH AND MIDDLE PACIFIC - I. EXTERILIUM *ARIOSOMA*-TYPE LARVAE. *J. Fac. Appl. Biol. Sci. Hiroshima Univ.* 21(1-2):35-66. 1982. SFA 28(2)
[Fac. Appl. Biol. Sci., Hiroshima Univ., Fukuoka, Japan]

83-001069 Mork, J.; P. Solemdal and G. Sundnes. IDENTIFICATION OF MARINE FISH EGGS: A BIOCHEMICAL GENETICS APPROACH. *Can. J. Fish. Aquatic Sci.* 40(3):361-369. Mar. 1983. In English with French summ. SFA 28(2)
[Biol. Stn., Trondheim, Norway]

83-001070 Mulligan, T. J.; L. Lapi; R. Kieser; S. B. Yamada and D. L. Duewer. SALMON STOCK IDENTIFICATION BASED ON ELEMENTAL COMPOSITION OF VERTEBRAE. *Can. J. Fish. Aquatic Sci.* 40(2):215-229. Feb. 1983. SFA 28(2)
[Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

IDENTIFICATION, KEYS, CLASSIFICATION (CONTINUED)

83-001071 Nelson, G. *ANCHOA ARGENTIVITTATA*, WITH NOTES ON OTHER EASTERN PACIFIC ANCHOVIES AND THE INDO-PACIFIC GENUS *ENCRASICHOLINA*. *Copeia* 1983(1):48-54. 10 Feb. 1983. SFA 28(2)
[Dep. Ichthyol., Am. Mus. Nat. Hist., New York, NY 10024]

83-001072 Nelson, J. S. *PTEROPSARON HEEMSTRAI* AND *OSOPSARON NATALENSIS* (PERCIFORMES: PERCOPHIDAE), NEW FISH SPECIES FROM SOUTH AFRICA, WITH COMMENTS ON *SQUAMICREEDIA OBTUSA* FROM AUSTRALIA AND ON THE CLASSIFICATION OF THE SUBFAMILY HEMEROCOETINAE. *J.L.B. Smith Inst. Ichthyol. Spec. Publ.* No. 25. 11p. Nov. 1982. SFA 28(2)
[Dep. Zool., Univ. Alberta, Edmonton, AB T6G 2E9, Canada]

83-001073 Pinchuk, V. I. [TAXONOMY AND DISTRIBUTION OF SHARKS OF THE GENUS *ISURUS*, WITH COMMENTS ON TAXONOMIC IMPORTANCE OF THE STRUCTURE OF TEETH.] *Zool. Zh.* 62(2):310-313. Feb. 1983. In Russian with English summ. SFA 28(2)
[Kherson Hydrobiol. Stn., Kherson, USSR]

83-001074 Poss, S. G. and R. R. Miller. TAXONOMIC STATUS OF THE PLAINS KILLIFISH, *FUNDULUS ZEBRINUS*. *Copeia* 1983(1):55-67. 10 Feb. 1983. SFA 28 (1)
[Div. Biol. Sci., Univ. Mich., Ann Arbor 48109]

83-001075 Randall, J. E. and A. R. Emery. A NEW LABRID FISH OF THE GENUS *CIRRHILABRUS* FROM THE CHAGOS ARCHIPELAGO, INDIAN OCEAN. *J. Aquaricult. Aquatic Sci.* 3(2):21-24. 1982. SFA 28(2)
[Bernice P. Bishop Mus., Box 19000-A, Honolulu, HI 96819]

83-001076 Seegers, L. *RIVULUS DELTAPHILUS* N. SP. AUS VENEZUELA. [*RIVULUS DELTAPHILUS* N. SP. FROM VENEZUELA.] *Senckenbergiana Biol.* 63(1-2):39-44. 20 Jan. 1983. In German with English summ. SFA 28(2)
[Hansaring 74, 5000 Köln 1, West Germany]

83-001077 Smith, G. R.; J. G. Hall; R. K. Koehn and D. J. Innes. TAXONOMIC RELATIONSHIPS OF THE ZUNI MOUNTAIN SUCKER, *CATOSTOMUS DISCOBOLUS YARROWI*. *Copeia* 1983(1):37-48. 10 Feb. 1983. SFA 28(2)
[Mus. Zool., Univ. Mich., Ann Arbor 48109]

83-001078 Snyder, D. E. IDENTIFICATION OF CATOSTOMID LARVAE IN PYRAMID LAKE AND THE TRUCKEE RIVER, NEVADA. *Trans. Am. Fish. Soc.* 112(2B):333-348. Mar. 1983. SFA 28(2)
[Larval Fish. Lab., Colo. State Univ., Fort Collins 80523]

83-001079 Svetovidov, A. N. TAXONOMIC DIFFERENCES BETWEEN RED HAKE, *UROPHYCIS CHUSS*, AND *U. TENUIS* (GADIDAE). *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):150-153. 1982. SFA 28(2)
[Zool. Inst., USSR Acad. Sci., Leningrad, USSR]

83-001080 Weems, R. E. and S. R. Horman. TELEOST FISH REMAINS (OSTEOGLOSSIDAE, BLOCHIIDAE, SCOMBRIDAE, TRIODONTIDAE, DIODONTIDAE) FROM THE LOWER EOCENE NANJEMOY FORMATION OF MARYLAND. *Proc. Biol. Soc. Wash.* 96(1):38-49. 25 Mar. 1983. SFA 28(2)
[U.S. Geol. Surv., Stop 928, Reston, VA 22092]

PARASITES AND DISEASES-GENERAL

83-001081 Aguirre, M.; A. B. Cairoli and D. A. Conroy. STUDIES ON THE FISH HEALTH STATUS OF MULLETS FROM THE EAST OF VENEZUELA. *Riv. It. Piscic. Ittiop.* 17(4):176-180. Oct.-Nov.-Dec. 1982. In English and Italian. SFA 28(2)

[Cent. Invest. Cientif., Univ. Oriente, Boca del Río, Isla de Margarita, Venezuela.]

83-001082 Bell, G. R. INVESTIGATION, ASSESSMENT AND CONTROL OF INFECTIOUS DISEASES OF SALMON ON THE PACIFIC COAST OF CANADA. *Riv. It. Piscic. Ittiop.* 17(4):145-171. Oct.-Nov.-Dec. 1982. In English and Italian. SFA 28(2)

[Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

83-001083 Kuhns, J. F. FISHDRUG/TXT: A COMPUTER GENERATED BIBLIOGRAPHIC INDEX OF THE DRUGS AND CHEMICALS USED IN TREATING FISH DISEASES - PART I. *J. Aquaricult.* 2(1):4-18. Mar. 1981. SFA 28(2)

[Aquasci. Res. Group, 1100 Gentry, North Kansas City, MO 64116] This paper, the first of four parts, is an index by substance of unannotated bibliographic citations of the literature dealing with the drugs and chemicals used in the treatment of organic and environmental disease of fishes. The substances are arranged numerically and alphabetically. Each entry is preceeded by a specific citation to the literature in which the substance (entry) is discussed. This first part includes the numerical section (substances in which a number is the first character in the name) and the portion of the alphabetical section (substances in which an upper-case Roman letter is the first character in the name) through the C's. This section has a total of 399 entries.

83-001084 Kuhns, J. F. FISHDRUG/TXT: A COMPUTER GENERATED BIBLIOGRAPHIC INDEX OF THE DRUGS AND CHEMICALS USED IN TREATING FISH DISEASES - PART IV. *J. Aquaricult.* 2(4):90-102. Dec. 1981. SFA 28(2)

[Aquasci. Res. Group, 1100 Gentry, North Kansas City, MO 64116] This paper, the fourth of four parts is an index by substance of unannotated bibliographic citations of the literature dealing with the drugs and chemicals used in the treatment of organic and environmental diseases of fish. The substances are arranged alphabetically. Each entry is followed by a specific citation to the literature in which the substance (entry) is discussed. This fourth part includes the portion of the alphabetical section (substances in which an upper-case Roman letter is the first character in the name) Q through Z and the third section which consists of entries in which lower-case Roman and upper- and lower-case Greek letters are the first characters. This part has a total of 384 entries.

83-001085 Kuhns, J. F. FISHDRUG/TXT: A COMPUTER GENERATED BIBLIOGRAPHIC INDEX OF THE DRUGS AND CHEMICALS USED IN TREATING FISH DISEASES - PART II. *J. Aquaricult.* 2(2):29-43. June 1981. SFA 28(2)

[Aquasci. Res. Group, 1100 Gentry, North Kansas City, MO 64116] This paper, the second of four parts, is an index by substance of unannotated bibliographic citations of the literature dealing with the drugs and chemicals used in the treatment of organic and environmental diseases of fishes. The substances are arranged alphabetically. Each entry is followed by a specific citation to the literature in which the substance (entry) is discussed. This second part includes the portion of the alphabetical section (substances in which an upper-case Roman letter is the first character in the name) D through L. This section has a total of 431 entries.

PARASITES AND DISEASES-GENERAL (CONTINUED)

83-001086 Mackie, G. L.; W. B. Morton and M. S. Ferguson. FISH PARASITISM IN A NEW IMPOUNDMENT AND DIFFERENCES UPSTREAM AND DOWNSTREAM. *Hydrobiologia* 99(3):197-205. 15 Mar. 1983. SFA 28(2)
[Dep. Zool., Univ. Guelph, Guelph, ON N1G 2W1, Canada] The parasitic fish fauna in Guelph Lake, a four-year old impoundment, were compared with those in upstream and downstream localities. The lacustrine assemblage of the young mesotrophic to eutrophic impoundment was dominated by the cestodes, *Ligula intestinalis* and *Proteocephalus ambloplites*, and the nematode, *Philometra* sp. The acanthocephalan, *Neoechinorhynchus saginatus*, and the nematode, *Rhabdacona cascadilla* dominated the rheophilous assemblage of fish parasites, but the prevalence rate and intensity of *R. cascadilla* was significantly reduced downstream.

83-001087 Oida, T.; K. Kouno; H. Katae; S. Nakamura; Y. Sekine and M. Hashimoto. [LEVELS OF PIROMIDIC ACID AND ITS METABOLITIES IN EEL TISSUES.] *Bull. Jpn. Soc. Sci. Fish.* 48(11):1599-1608. Nov. 1982. In Japanese with English summ. SFA 28(2)
[Res. Lab., Dainippon Pharmaceutical Co. Ltd., Osaka 564, Japan]

83-001088 Snieszko, S. F. DISEASES OF FISHES: RESEARCH AND CONTROL. *Fisheries (Bull. Am. Fish. Soc.)* 8(1):20-22. Jan.-Feb. 1983. SFA 28(2)
[U.S. FWS, Box 700, Kearneysville, WV 25430]

83-001089 Stuart, N. C. DISEASES OF FARMED FISH: NON-SALMONIDS INCLUDING EELS AND CRUSTACEA. *Vet. Rec.* 112(7):150-153. 12 Feb. 1983. SFA 28(2)
[5 Church Hill, Helston, Cornwall, England]

83-001090 Vergara, L. A. and M. George-Nascimento. CONTRIBUCIÓN AL ESTUDIO DEL PARASITISMO EN EL CONGRIO COLORADO *GENYPTERUS CHILENSIS* (GUICHENOT, 1848). [CONTRIBUTION TO THE STUDY OF PARASITISM IN THE CHILEAN CUSK EEL *GENYPTERUS CHILENSIS* (GUICHENOT, 1848).] *Bol. Chil. Parasitol.* 37(1-2):9-14. 1982. In Spanish with English summ. SFA 28(2)
[Dep. Biol. Tecnol., Pontif. Univ. Católi. Chile, Talcahuano, Chile]

83-001091 Wier, W.; L. F. Mayberry; H. G. Kinzer and P. R. Turner. PARASITES OF FISHES IN THE GILA RIVER DRAINAGE IN SOUTHWESTERN NEW MEXICO. *J. Wildl. Dis.* 19(1):59-60. Jan. 1983. SFA 28(2)
[1707A S. Washington Ave., Roswell, NM 88201]

BACTERIAL DISEASES

83-001092 Agius, C.; M. T. Horne and P. D. Ward. IMMUNIZATION OF RAINBOW TROUT, *SALMO GAIRDNERI* RICHARDSON, AGAINST VIBRIOSIS: COMPARISON OF AN EXTRACT ANTIGEN WITH WHOLE CELL BACTERINS BY ORAL AND INTRAPERITONEAL ROUTES. *J. Fish Dis.* 6(2):129-134. Mar. 1983. SFA 28(2)
[Sch. Chem. Phys. Sci., Kingston Polytech., Kingston, Surrey, England] An extract vaccine against *Vibrio anguillarum* was compared with other vaccine preparations when administered to rainbow trout intraperitoneally or orally on food. Intraperitoneal vaccination resulted in virtually 100% protection within two weeks whereas oral vaccination gave a maximum protection of 50-70% after eight weeks. When administered intraperitoneally the extract performed better than formalin killed cells but when administered orally formalin killed cells were better. The addition of alum as adjuvant enhanced the response to antigen administered by both routes. Serum agglutinin titres after oral vaccination were low and variable but after intraperitoneal injection they reached a consistent peak of 64. As the

BACTERIAL DISEASES (CONTINUED)

83-001092 CONTINUED response to oral vaccination was so low it was not possible to relate agglutinin titre to protection in a quantitative relationship.

83-001093 Aoki, T.; T. Kitao; N. Iemura; Y. Mitoma and T. Nomura. THE SUSCEPTIBILITY OF *AEROMONAS SALMONICIDA* STRAINS ISOLATED IN CULTURED AND WILD SALMONIDS TO VARIOUS CHEMOTHERAPEUTICS. *Bull. Jpn. Soc. Sci. Fish.* 49(1):17-22. Jan. 1983. SFA 28(2)
[Dep. Fish., Fac. Agric., Miyazaki Univ., Miyazaki 880, Japan]

83-001094 Austin, B.; J. Rayment and D. J. Alderman. CONTROL OF FURUNCULOSIS BY OXOLINIC ACID. *Aquaculture* 31(2-4):101-108. Mar. 1983. SFA 28(2)
[Fish Dis. Lab., Weymouth, Dorset DT4 8UB, England] From a comparison of 50 antimicrobial agents, the usefulness of oxolinic acid was indicated for the control of furunculosis in brown and rainbow trout. From in vitro and in vivo experiments, it was deduced that oxolinic acid rapidly inactivated the bacterial cells, and controlled the disease manifestation in fish.

83-001095 Bosse, M. P. and G. Post. TRIBRISSEN AND TIAMULIN FOR CONTROL OF ENTERIC REDMOUTH DISEASE. *J. Fish Dis.* 6(1):27-32. Jan. 1983. SFA 28(2)
[G. Post: Dep. Fish. Wildl. Biol., Colo. State Univ., Fort Collins 80523]

83-001096 Bullock, G. L.; G. Maestrone; C. Starliper and B. Schill. FURUNCULOSIS: RESULTS OF FIELD TRIALS FOR THERAPY WITH Ro5-0037, A POTENTIATED SULFONAMIDE. *Prog. Fish-Cult.* 45(1):51-53. Jan. 1983. SFA 28(2)
[U.S. FWS, Natl. Fish Health Res. Lab., Box 700, Kearneysville, WV 25430]

83-001097 Cipriano, R. C. RESISTANCE OF SALMONIDS TO *AEROMONAS SALMONICIDA*: RELATION BETWEEN AGGLUTININS AND NEUTRALIZING ACTIVITIES. *Trans. Am. Fish. Soc.* 112(1):95-99. Jan. 1983. SFA 28(2)
[Natl. Fish Health Res. Lab., U.S. FWS, Box 700, Kearneysville, WV 25430]

83-001098 Ellis, A. E.; G. Dear and D. J. Stewart. HISTOPATHOLOGY OF 'SEKITEN-BYO' CAUSED BY *PSEUDOMONAS ANGUILLISEPTICA* IN THE EUROPEAN EEL, *ANGUILLA ANGUILLA* L., IN SCOTLAND. *J. Fish Dis.* 6(1):77-79. Jan. 1983. SFA 28(2)
[Mar. Lab., P.O. Box 101, Victoria Rd., Aberdeen AB9 8DB, Scotland]

83-001099 Fensch, G. E.; J. A. Osborne and J. F. Charba. ASPECTS OF THE BIOLOGY OF *AEROMONAS HYDROPHILA* WITH RESPECT TO THE STRIPED MULLET, *MUGIL CEPHALUS* L. IN THE ST. JOHNS RIVER. *Fla. Sci.* 46(Suppl. 1):19. 1983. Abstract only. SFA 28(2)
[Dep. Biol. Sci., Univ. Cent. Fla., P.O. Box 25000, Orlando 32816] The aspects of the biology of *Aeromonas hydrophila* with respect to a striped mullet (*Mugil cephalus* L.) nursery ground were examined. *A. hydrophila* density in the natural water was found to be strongly correlated with water turbidity and weakly correlated with water temperature. No correlations were found with depth, dissolved oxygen, pH, total alkalinity, specific conductivity or chlorophyll *a* pigment concentration in the water. *A. hydrophila* densities/g dry weight of stomach contents were

BACTERIAL DISEASES (CONTINUED)

83-001099 CONTINUED found to be correlated with chlorophyll *a* pigment concentration/g dry weight of stomach contents. The survivability of striped mullet after capture by electroshocking was increased from 0% to almost 100% through the use of a fish tranquilizer (Quinaldine) and a reduction of crowding which reduced stress.

83-001100 Gratzek, J. B.; J. P. Gilbert; A. L. Lohr; E. B. Shotts, Jr. and J. Brown. ULTRAVIOLET LIGHT CONTROL OF *ICHTHYOPHTHIRIUS MULTIFILIIS* FOUQUET IN A CLOSED FISH CULTURE RECIRCULATION SYSTEM. *J. Fish Dis.* 6(2):145-153. Mar. 1983. SFA 28(2)
[Dep. Med. Microbiol., Coll. Vet. Med., Univ. Ga., Athens 30602]

83-001101 Hahnel, G. B.; R. W. Gould and E. S. Boatman. SEROLOGICAL COMPARISON OF SELECTED ISOLATES OF *AEROMONAS SALMONICIDA* SSP. *SALMONICIDA*. *J. Fish Dis.* 6(1):1-11. Jan. 1983. SFA 28(2)
[R.W. Gould: Natl. Fish. Res. Cent., Bldg. 204, Naval Support Activity, Seattle, WA 98115]

83-001102 Kitao, T.; T. Aoki; M. Fukudome; K. Kawano; Y. Wada and Y. Mizuno. SEROTYPING OF *VIBRIO ANGUILLARUM* ISOLATED FROM DISEASED FRESHWATER FISH IN JAPAN. *J. Fish Dis.* 6(2):175-181. Mar. 1983. SFA 28(2)
[Dep. Fish., Fac. Agric., Miyazaki Univ., Miyazaki 880, Japan]

83-001103 Kusuda, R.; K. Kawai and T. Shirakawa. [SERIOLOGICAL STUDY OF *STREPTOCOCCUS* SP. PATHOGENETIC TO CULTURED YELLOWTAIL.] *Bull. Jpn. Soc. Sci. Fish.* 48(12):1731-1738. Dec. 1982. SFA 28(2)
[Fish. Dis. Lab., Fac. Agric., Kochi Univ., Nankoku, Kochi 783, Japan] In the previous paper it was revealed that the causative organism of the streptococcal infection in cultured yellowtail *Seriola quinqueradiata* had biological and biochemical characteristics intermediate between *Streptococcus faecalis* and *S. faecium*. However, serological details had not been examined. In this paper, some serological characteristics were examined in order to make the taxonomical position clear. Groupings of the strains was performed by capillary tube test and Ouchterlony's test. Typing was performed by agglutination reaction and immunoelectrophoresis. All of 86 strains isolated from yellowtail and some strains isolated from amberjack, dragonet and eel had common group sepcific antigen extracted by Lancefield's method. But this antigen was different from the antigens of group A to H, K, L, N, O and MG. Further it was revealed that the new group specific antigen did not exist in the cell wall as in the case of the group D streptococci. Some other antigens were detected in the cell wall by immunoelectrophoresis and on the cell surface by agglutinaton reaction. These antigens were deteced in all the pathogenic strains. It is concluded that the pathogenic strains consist of a new group of *Streptococcus* not reported before. Further attempts in classifying the group into types were done, but the result was unsuccessful.

83-001104 Lesel, R. and P. Le Gac. TRANSIT OF ENTEROBACTERIA ORIGINATING FROM HOMEOTHERMS IN FISH LIVING AT LOW TEMPERATURE. *Aquaculture* 31(2-4):109-115. Mar. 1983. SFA 28(2)
[Lab. Microorgan., I.N.R.A. Cent. Rech. Hydrobiol., B.P. 3, Saint-Pé-sur-Nivelle, 64310 Ascain, France] The transit of three enterobacteria (*Escherichia coli, Salmonella typhimurium, Serratia* sp.)

BACTERIAL DISEASES (CONTINUED)

83-001104 CONTINUED normally housed in the digestive tract of homeotherms was experimentally studied in rainbow trout. Bacterial bodies occurred very soon after ingestion of the marked pellet by fish and showed that a part of the microbial population at least did not accompany the solid phase. The excretion of bacteria varied with the strain utilized and according to the temperature. The strains did not seem to multiply when passing through the digestive compartments.

83-001105 McCarthy, D. H.; D. F. Amend; K. A. Johnson and J. V. Bloom. *AEROMONAS SALMONICIDA*: DETERMINATION OF AN ANTIGEN ASSOCIATED WITH PROTECTIVE IMMUNITY AND EVALUATION OF AN EXPERIMENTAL BACTERIN. *J. Fish Dis.* 6(2):155-174. Mar. 1983. SFA 28(2)
[D.F. Amend: Sch. Vet. Med., Dep. Med., Univ. Calif., Davis 95616]

83-001106 Michel, C. and J. F. Bassalert. INFLUENCE DE LA TEMPÉRATURE SUR LES RÉSULTATS DE L'ANTIBIOGRAMME PRATIQUÉ PAR LA MÉTHODE DE DIFFUSION EN ICHTYOPATHOLOGIE. [EFFECT OF TEMPERATURE ON THE ANTIBIOTIC SENSITIVITY TEST PERFORMED BY THE DISK METHOD IN FISH PATHOLOGY.] *Ann. Rech. Vet.* 13(3):245-250. 1982. SFA 28(2)
[Lab. Ichtyopathol., INRA, 78850 Thiverval-Grignon, France]

83-001107 Nomura, S. and H. Saito. PRODUCTION OF THE EXTRACELLULAR HEMOLYTIC TOXIN BY AN ISOLATED STRAIN OF *AEROMONAS SALMONICIDA*. *Bull. Jpn. Soc. Sci. Fish.* 48(11):1589-1597. Nov. 1982. SFA 28(2)
[Sch. Fish. Sci., Kitasato Univ., Sanriku, Kesen, Iwate 022-01, Japan]

83-001108 Sato, N.; N. Yamane and T. Kawamura. SYSTEMIC *CITROBACTER FREUNDII* INFECTION AMONG SUNFISH *MOLA MOLA* IN MATSUSHIMA AQUARIUM. *Bull. Jpn. Soc. Sci. Fish.* 48(11):1551-1557. Nov. 1982. SFA 28(2)
[Clin. Microbiol. Br., Cent. Clin. Lab., Tohoku Univ. Sch. Med., Sendai 980, Japan]

83-001109 Stewart, D. J.; K. Woldemariam; G. Dear and F. M. Mochaba. AN OUTBREAK OF 'SEKITEN-BYO' AMONG CULTURED EUROPEAN EELS, *ANGUILLA ANGUILLA* L., IN SCOTLAND. *J. Fish Dis.* 6(1):75-76. Jan. 1983. SFA 28(2)
[Dep. Biol. Sci., Heriot-Watt Univ., Chambers St., Edinburgh EH1 1HX, Scotland]

83-001110 Taniguchi, M. [EXPERIMENT ON PERORAL INOCULATION *VIA* FOOD TO INDUCE YELLOWTAIL STREPTOCOCCICOSIS.] *Bull. Jpn. Soc. Sci. Fish.* 48(12):1717-1720. Dec. 1982. In Japanese with English summ. SFA 28(2)
[Kochi Pref. Freshwater Fish. Lab., Tosayamada, Kochi 782, Japan] The peroral inoculation experiments are considered to be important in the study for establishing preventive measures against the streptococcicosis of yellowtail. Until now, it has not been possible to reproduce the streptococcicosis in yellowtail with typical symptoms, so that in this study it was examined how to reproduce the typical symptoms by the peroral inoculation method through food. The typical symptoms of the disease observed in the peroral inoculation tests were as follows: opthalmitis with bloody pus, redness at eyeball; melting of branchiostegal membrane, caseous pus and redness at inside of operculum; caseous pus at basal part of fins and caudal peduncle; bloody pus, redness at the part between palatine and vomer; redness of arterial bulb, thickening of epicardium and adhesive epicarditis;

BACTERIAL DISEASES (CONTINUED)

83-001110 CONTINUED thickening of serosa, congestion and bleeding at liver. These symptoms appeared within 2 weeks after doseing the pathogen, when the pathogen was mixed into homogenized fish meat or injected under the skin of food fish. It was not so important to add the culture fluid of pathogen for promoting the appearance of symptoms. The effective number of pathogens dosed was 10^5 cells per individual yellowtail weighing 300-500 g in body weight in the case of mixing pathogen into homogenized fish meat, and 10^9 cells per individual yellowtail in the case of injecting pathogen under the skin of food fish.

83-001111 Taniguchi, M. [INFLUENCE OF FOOD CONDITION ON ARTIFICIAL PERORAL INFECTION OF YELLOWTAIL STREPTOCOCCICOSIS.] *Bull. Jpn. Soc. Sci. Fish.* 48(12):1721-1723. Dec. 1982. In Japanese with English summ. SFA 28(2)
[Kochi Pref. Freshwater Fish. Lab., Tosayamada, Kochi 782, Japan] Influence of food condition used for application of pathogen on the appearance of streptococcicosis were examined by the peroral inoculation test for yellowtail. The incidence of the disease in the test were remarkably different depending on the food condition given to yellowtail, such as the form of food (whole, chopped, and pellets) and the state of food (raw, frozen, and thawed). The incidence was very high in the case of chopped food, and no disease occurred in the case of whole food, when sand launce (large size) and sardine were used for food species. The disease did not occur either in the case of pellets. The incidence of the disease was higher in the case of thawed food than in the case of frozen food. It was suggested that the thawed food accelerates the appearance of the streptococcicosis.

FUNGAL DISEASES

83-001112 Bailey, T. A. METHOD FOR *IN VITRO* SCREENING OF AQUATIC FUNGICIDES. *J. Fish Dis.* 6(2):91-100. Mar. 1983. SFA 28(2)
[U.S. FWS, Natl. Fish. Res. Lab., P.O. Box 818, La Crosse, WI 54601]

83-001113 Bailey, T. A. SCREENING FUNGICIDES FOR USE IN FISH CULTURE: EVALUATION OF THE AGAR PLUG TRANSFER, CELLOPHANE TRANSFER, AND AGAR DILUTION METHODS. *Prog. Fish-Cult.* 45(1):24-27. Jan. 1983. SFA 28(2)
[Dep. Zool., Iowa State Univ., Ames 50011]

83-001114 Bailey, T. A. THE INHIBITORY EFFECTS OF TWENTY-FIVE FUNGICIDES ON FOUR SPECIES OF AQUATIC FUNGI (SAPROLEGNIALES) PATHOGENEIC TO FISH. *Proc. Iowa Acad. Sci.* 90(1): Mar. 1983. Abstract only. SFA 28(2)
[Natl. Fish. Res. Lab., P.O. Box 818, La Crosse, WI 54601] Salmonids, ictalurids, and other cultured fish are susceptible to fungal infection. This study was performed to identify potential fungicidal agents. Four species of aquatic fungi (*Achlya flagellata, A. racemosa, Saprolegnia hypogyna,* and *S. megasperma*) were exposed to 25 chemicals representing seven classes for 15 or 60 minutes. The antifungal activity of each test chemical was compared to a reference compound, malachite green. The following six compounds, ranked in order of decreasing anti-fungal activity, inhibited fungal growth on artificial media at concentrations less than 100 mg/L: Malachite green > Du-ter > Copper oxychloride sulfate > Lesan > BAS-389-01F > Cuprimyxin > Roccal II. Data obtained from this study indicate that the cationic class of compounds shows some promise as aquatic fungicides. In addition, the amines and amide compounds should receive further attention to determine their effectiveness against aquatic fungi.

FUNGAL DISEASES (CONTINUED)

83-001115 Dentler, J. L. POTENTIAL TREATMENTS TO CONTROL THE FUNGI *SAPROLEGNIA* OF SALMON AND TROUT - A REVIEW. *Oreg. Dep. Fish Wildl. Fish. Div. Inf. Rep.* No. 82-8. ii + 23p. Nov. 1982. SFA 28(2)
[Oreg. Dep. Fish Wildl., Hatchery Practices Group, Corvallis]

83-001116 Prabhuji, S. K.; G. C. Srivastava; S. J. H. Rizvi and S. N. Mathur. 1,3,7-TRIMETHYLXANTHINE (CAFFEINE); A NEW NATURAL FISH FUNGICIDE. *Experientia (Basel)* 39(2):177-179. 15 Feb. 1983. SFA 28(2)
[Dep. Bot., U.N. Postgrad. Coll., Podrauna-274304, India] During antifungal screening of products from higher plants 1,3,7-trimethyxanthine (caffeine), isolated from the seeds of *Coffea arabica*, was found to exhibit strong fungitoxicity. The fungicidal ability of caffeine has been tested in vitro on 4 fish pathogenic species of Saprolegniacea. The applicability of this chemical has also been tested by conducting tolerance tests, using *Colisa lalia* and *Puntius sophore* as test-fishes. The present studies have established that caffeine is a potential fish fungicide.

PROTOZOAN DISEASES

83-001117 Ball, S. J. *EIMERIA METCHNIKOVI* (LAVERAN, 1897) REICHENOW, 1921 FROM THE GUDGEON, *GOBIO GOBIO* L., IN SOUTH-EAST ENGLAND. *J. Fish Dis.* 6(2):201-203. Mar. 1983. SFA 28(2)
[Dep. Biol., North East London Polytech., Romford Rd., London E15 4LZ, England]

83-001118 Dyková, I.; J. Lom and G. Grupcheva. *EIMERIA BRANCHIPHILA SP.NOV. SPORULATING IN THE GILL FILAMENTS OF ROACH, RUTILUS RUTILUS* L. *J. Fish Dis.* 6(1):13-18. Jan. 1983. SFA 28(2)
[Inst. Parasitol., Czech. Acad. Sci., Prague, Czechoslovakia]

83-001119 Guest, W. C. CONTROL OF ICHTHYOPHTHIRIUS IN PEACOCK BASS FINGERLINGS. *Prog. Fish-Cult.* 45(1):57. Jan. 1983. SFA 28(2)
[Ft. Worth Res. Unit, Tex. Parks Wildl. Dep., 6200 Hatchery Rd., Ft. Worth 76114]

83-001120 Hawkins, W. E.; M. A. Solangi and R. M. Overstreet. ULTRASTRUCTURE OF THE MACROGAMONT OF *EIMERIA FUNDULI*, A COCCIDIUM PARASITIZING KILLIFISHES. *J. Fish Dis.* 6(1):33-43. Jan. 1983. SFA 28(2)
[Gulf Coast Res. Lab., Box AG, Ocean Springs, MS 39564]

83-001121 Hawkins, W. E.; M. A. Solangi and R. M. Overstreet. ULTRASTRUCTURE OF THE MICROGAMONT AND MICROGAMETE OF *EIMERIA FUNDULI*, A COCCIDIUM PARASITIZING KILLIFISHES. *J. Fish Dis.* 6(1):45-57. Jan. 1983. SFA 28(2)
[Gulf Coast Res. Lab., Box AG, Ocean Springs, MS 39564]

83-001122 Paperna, I. A *CHLOROMYXUM*-LIKE MYXOSPOREAN INFECTION IN THE STOMACH OF CULTURED *SPARUS AURATA* (L.). *J. Fish Dis.* 6(1):85-89. Jan. 1983. SFA 28(2)
[H. Steinitz Mar. Biol. Lab., P.O. Box 469, Eilat, Israel]

VIRAL DISEASES

83-001123 Flick, W. A. OBSERVATIONS ON LOONS AS PREDATORS ON BROOK TROUT AND AS POSSIBLE TRANSMITTERS OF INFECTIOUS PANCREATIC NECROSIS (IPN). *N. Am. J. Fish. Manage.* 3(1):95-96. 1983. SFA 28(2)
[Dep. Nat. Resour., Cornell Univ., Ithaca, NY 14853]

83-001124 McAllister, P. E. INFECTIOUS PANCREATIC NECROSIS (IPN) OF SALMONID FISHES. *U.S. Fish Wildl. Serv. Fish Dis. Leafl.* 65. 12p. 1983. SFA 28(2)
[U.S. FWS, Natl. Fish Health Res. Lab., Kearneysville, WV 25430]

83-001125 Mulcahy, D. and K. Bauersfeld. EFFECT OF LOADING DENSITY OF SOCKEYE SALMON, *ONCORHYNCHUS NERKA* (WALBAUM), EGGS IN INCUBATION BOXES ON MORTALITY CAUSED BY INFECTIOUS HAEMATOPOIETIC NECROSIS. *J. Fish Dis.* 6(2):189-193. Mar. 1983. SFA 28(2)
[U.S. FWS, Natl. Fish. Res. Cent., Bldg. 204, Naval Support Activity, Seattle, WA 98115]

83-001126 Mulcahy, D.; R. J. Pascho and C. K. Jenes. TITRE DISTRIBUTION PATTERNS OF INFECTIOUS HAEMATOPOIETIC NECROSIS VIRUS IN OVARIAN FLUIDS OF HATCHERY AND FERAL SALMON POPULATIONS. *J. Fish Dis.* 6(2):183-188. Mar. 1983. SFA 28(2)
[U.S. FWS, Natl. Fish Res. Cent., Bldg. 204, Naval Support Activity, Seattle, WA 98115]

83-001127 Okamoto, N.; T. Sano; R. P. Hedrick and J. L. Fryer. ANTIGENIC RELATIONSHIPS OF SELECTED STRAINS OF INFECTIOUS PANCREATIC NECROSIS VIRUS AND EUROPEAN EEL VIRUS. *J. Fish Dis.* 6(1):19-25. Jan. 1983. SFA 28(2)
[Lab. Fish Pathol., Dep. Aquacult., Tokyo Univ. Fish., 4-5-7 Konan, Minato-ku, Tokyo 108, Japan]

OTHER DISEASES AND PARASITES

83-001128 Anyanwu, A. O. PARASITIC INFESTATIONS OF *PSEUDOTOLITHUS* SPP. OFF THE COAST OF LAGOS, NIGERIA. *J. Fish Biol.* 22(1):29-33. Jan. 1983. SFA 28(2)
[Nigerian Inst. Oceanogr. Mar. Res., P.M.B. 12729, Victoria Island, Lagos, Nigeria]

83-001129 Berland, B. REDESCRIPTION OF *CUCULLANUS ELONGATUS* SMEDLEY, 1933 (NEMATODA: SEURATOIDEA) FROM THE LINGCOD *OPHIODON ELONGATUS* GIRARD, 1854 FROM THE PACIFIC COAST OF CANADA. *Can. J. Zool.* 61(2):385-395. Feb. 1983. In English with French summ. SFA 28(2)
[Zool. Lab., Univ. Bergen, Allégaten 41, N-5000 Bergen, Norway]

83-001130 Bugaev, V. F. INFESTATION OF SOCKEYE SALMON, *ONCORHYNCHUS NERKA*, WITH THE PLEROCERCOIDS OF *DIPHYLLOBOTHRIUM* SP. IN THE KAMCHATKA RIVER BASIN. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):141-149. 1982. SFA 28(2)
[KoTINRO, Petropavlovsk-Kamchatskiy, USSR]

OTHER DISEASES AND PARASITES (CONTINUED)

83-001131 Campana, S. E. MORTALITY OF STARRY FLOUNDERS (*PLATICHTHYS STELLATUS*) WITH SKIN TUMORS. *Can. J. Fish. Aquatic Sci.* 40(2):200-207. Feb. 1983. SFA 28(2)
[Inst. Anim. Resour. Ecol., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

83-001132 Cheung, P. L.; R. F. Nigrelli and G. D. Ruggieri. *PHOREIOBOTHRIUM TIBURONIS*, NEW SPECIES, (CESTODA: ONCOBOTHRIIDAE) FROM BONNETHEAD SHARK, *SPHYRNA TIBURO* (L.). *J. Aquaricult.* 2(4):81-85. Dec. 1981. SFA 28(2)
[Osborn Lab. Mar. Sci., N.Y. Aquarium, N.Y. Zool. Soc., Brooklyn 14224]

83-001133 Cone, D. K. and M. Wiles. COMPARATIVE MORPHOLOGY OF *GYRODACTYLUS GROENLANDICUS* LEVINSEN, 1881, *G. NAINUM* HANEK AND THRELFALL, 1970, *G. PLEURONECTI* CONE, 1981, AND *G. ADSPERSI* SP. N. (MONOGENEA) FROM NORTHWEST ATLANTIC FISHES. *Can. J. Zool.* 61(2):417-422. Feb. 1983. In English with French summ. SFA 28(2)
[Biol. Dep., Saint Mary's Univ., Halifax, NS B3H 3C3, Canada]

83-001134 DeVore, P. W. and J. G. Eaton. AN INVESTIGATION OF SPINAL DEFORMITY OF TROUT (*SALMO* SP.) IN THE BRULE RIVER, WISCONSIN. *J. Great Lakes Res.* 9(1):69-73. 1983. SFA 28(2)
[Lake Superior Basin Stud. Cent., Univ. Minn., Duluth 55812] An unusually high incidence of spinal deformity in migratory trout from the Brule River, Wisconsin, was investigated to determine its probable cause and extent. Incidence in rainbow trout (*Salmo gairdneri*) and brown trout (*Salmo trutta*) was determined by external examination and x-ray. The total incidence of deformity in x-rayed and externally examined lake-run rainbow trout was 50 and 26 percent, respectively. No vertebral anomalies were found by x-ray in 75 Brule River juvenile rainbow trout which had not yet emigrated to Lake Superior, nor in 25 lake-run rainbow trout from the French River, Minnesota. Examination of 25 lake-run brown trout from the Brule River showed external deformity (8 percent) and internal vertebral abnormalities (16 percent). The absence of spinal deformity in juvenile rainbow trout from the Brule River and in lake-run trout from the French River suggest that the electric lamprey control weir on the Brule was affecting fish which migrated downstream. The lower incidence of injury in brown trout reflects the difference in the time of their migration which was not coincident with weir operation. It is apparent that the electric lamprey weir has had a greater total impact on recruitment of trout to Lake Superior than previously thought.

83-001135 Eaton, W.; H. Robinson; H. Hassur and J. Hendricks. A NEMATODE INFECTION IN THE NORTHERN ANCHOVY FROM SAN FRANCISCO BAY. *Cal-Neva Wildl.* 1982:16-26. 1982. SFA 28(2)
[San Jose State Univ., Dep. Biol., San Jose, CA]

83-001136 Fryer, G. and C. Andrews. THE PARASITIC COPEPOD *ERGASILUS BRIANI* MARKEWITSCH IN YORKSHIRE: AN ADDITION TO THE BRITISH FAUNA. *Naturalist* 108(964):7-10. Jan.-Mar. 1983. SFA 28(2)
[Freshwater Biol. Assoc., Ferry House, Ambleside, Far Sawrey, England]

83-001137 Galeano, M. L. and M. Romero. CONTRIBUCION AL CONOCIMIENTO DE PARASITOS DE PECES DE LA CIENAGA GRANDE DE SANTA MARTA. I FAMILIA ACANTHOCOLPIDAE (TREMATODA: DIGENEA). [CONTRIBUTION TO KNOWLEDGE OF PARASITES

OTHER DISEASES AND PARASITES (CONTINUED)

83-001137 CONTINUED OF FISHES OF THE CIÉNAGA GRANDE DE SANTA MARTA. I FAMILY COLPIDAE (TREMATODA: DIGENEA).] *An. Inst. Invest. Mar. Punta Bet* 11:195-217. 1979. In Spanish with English summ. SFA 28(2)
[INVEMAR, Ap. Aéreo 1016, Santa Maria, Colombia]

83-001138 Grizzle, J. M. and E. H. Williams, Jr. DERMAL FIBROMA IN REDBAND PAROTFISH, *SPARISOMA AUROFRENATUM* (VALENCIENNES). *J. Fish Dis* 6(2):205-209. Mar. 1983. SFA 28(2)
[Dep. Fish. Allied Aquacult., Auburn Univ., AL 36849]

83-001139 Hoenig, J. M. and A. H. Walsh. SKELETAL LESIONS AND DEFORMITIE IN LARGE SHARKS. *J. Wildl. Dis.* 19(1):27-33. Jan. 1983. SFA 28(2)
[A.H. Walsh: Pfizer Central Research, Eastern Point Road, Graton, C 06340] Four blunt-snouted sandbar sharks (*Carcharhinus plumbeus*) were note among 555 examined over a 13-yr period. Radiographs of one specimen revealed that the three rostral cartilage rods were abnormally short and failed t join at the anterior tip. The deformity appeared to be congenital. Fou cases of vertebral lesions were noted in three species of shar (*Carcharhinus plumbeus, Negaprion brevirostris* and *Odontaspis taurus*). Th vertebral columns had fused centra, ribs and neural arches, ext deposition and erosion of calcified material in the centra, and in one cas compression of centra. The causes of the vertebral lesions are unknown.

83-001140 Hubschman, J. H. A CALANOID COPEPOD AS INTERMEDIATE HOST OF ACANTHOCEPHALAN. *Ohio J. Sci.* 83(2):6. Apr. 1983. Abstract only. SFA 28(2)
[Biol. Sci., Wright State Univ., Dayton, OH 45435]

83-001141 Kearn, G. C. and J. E. Green. *SQUALOTREMA LLEWELLYNI* GEN. NOV SP. NOV., A MONOCOTYLID MONOGENEAN FROM THE NASAL FOSSAE OF THE SPUR-DO *SQUALUS ACANTHIAS*, AT PLYMOUTH. *J. Mar. Biol. Assoc. U.K.* 63(1):17-25. Fe 1983. SFA 28(2)
[Sch. Biol. Sci., Univ. East Anglia, Norwich, NR4 7TJ England]

83-001142 Kimura, I.; S. Morikawa; T. Kiriyama and H. Kitaori. EPIZOOTIC OCCURRENCE OF RHABDOMYOMA AND A CASE OF GANGLIONEUROMA HATCHERY-REARED AYU, *PLECOGLOSSUS ALTIVELIS* TEMMINCK & SCHLEGEL. *J. Fi Dis.* 6(2):195-200. Mar. 1983. SFA 28(2)
[Lab. Viral Oncol., Aichi Cancer Cent. Res. Inst., Tashiro-cho, Chikus ku, Nagoya, Japan]

83-001143 Lester, R. J. G. and W. R. Kelly. TUMOUR-LIKE GROWTHS FR SOUTHERN AUSTRALIAN MARINE FISH. *Tasmanian Fish. Res.* No. 25. p. 27-32. Ma 1983. SFA 28(2)
[Dep. Parasitol., Univ. Queensland, St. Lucia, Brisbane, Queenslan Australia, 4067]

83-001144 Mitchell, L. G.; J. Ginal and W. C. Bailey. MELANOTIC VISCER FIBROSIS ASSOCIATED WITH LARVAL INFECTIONS OF *POSTHODIPLOSTOMUM MINIMUM* A *PROTEOCEPHALUS* SP. IN BLUEGILL, *LEPOMIS MACROCHIRUS* RAFINESQUE, IN CENTR IOWA, U.S.A. *J. Fish Dis.* 6(2):135-144. Mar. 1983. SFA 28(2)
[Dep. Zool., Iowa State Univ., Ames 50011]

OTHER DISEASES AND PARASITES (CONTINUED)

83-001145 Moles, A. EFFECT OF PARASITISM BY MUSSEL GLOCHIDIA ON GROWTH OF COHO SALMON. *Trans. Am. Fish. Soc.* 112(2A):201-204. Mar. 1983. SFA 28(2)
[NMFS, P.O. Box 155, Auke Bay, AK 99821]

83-001146 Mugridge, R. E. R. and H. G. Stallybrass. A MORTALITY OF EELS, *ANGUILLA ANGUILLA* L., ATTRIBUTED TO GNATHIIDAE. *J. Fish Dis.* 6(1):81-82. Jan. 1983. SFA 28(2)
[South. Water Auth., Lewes Rd., Falmer, Brighton, England]

83-001147 Munger, G. J. THE OCCURRENCE OF *ANISAKIS* SP. TYPE I LARVAE (OSHIMA 1972) (NEMATODA: ANISAKIDAE) IN FISHES FROM THE GULF OF ALASKA AND THE BERING SEA. *Can. J. Zool.* 61(1):266-268. Jan. 1983. In English with French summ. SFA 28(2)
[478 Dorset Ave., Burlington, ON L7T 2W2, Canada]

83-001148 Obradović, J.; Mafan, B. and R. Sabočanec. PAPILLOMATOSIS IN THE SHEAT-FISH, *SILURUS GLANIS* L. *J. Fish Dis.* 6(1):83-84. Jan. 1983. SFA 28(2)
['Rudjer Bošković' Inst., Cent. Mar. Res., Zagreb, Yugoslavia]

83-001149 Oliva, M. and L. E. Durán. *LERNANTHROPUS PACIFICUS* N. SP. (CRUSTACEA: COPEPODA) PARÁSITO EN LA CORVINILLA *SCIAENA GILBERTI* (ABBOTT) (PISCES: TELEOSTEI). [*LERNANTHROPUS PACIFICUS* N. SP. (CRUSTÁCEA: COPEPODA) PARASITE IN *SCIAENA GILBERTI* (ABBOTT) (PISCES: TELEOSTEI).] *Bol. Chil. Parasitol.* 37(1-2):15-17. 1982. In Spanish with English summ. SFA 28(2)
[Inst. Oceanol., Univ. Antofagasta, Casilla 1240, Antofagasta, Chile]

83-001150 Pálsson, J. and M. Beverley-Burton. *LAMINISCUS* N.G. (MONOGENEA: GYRODACTYLIDAE) FROM CAPELIN, *MALLOTUS VILLOSUS* (Müller), (PISCES: OSMERIDAE) IN THE NORTHWEST ATLANTIC WITH REDESCRIPTIONS OF *L. GUSSEVI* N. COMB., *GYRODACTYLOIDES PETRUSCHEWSKII* AND *G. ANDRIASCHEWI*. *Can. J. Zool.* 61(2):298-306. Feb. 1983. In English with French summ. SFA 28(2)
[Dep. Zool., Coll. Biol. Sci., Univ. Guelph, Guelph, ON N1G 2W1, Canada]

83-001151 Renaud, F.; C. Gabrion and N. Pasteur. LE COMPLEXE *BOTHRIOCEPHALUS SCORPII* (MUELLER, 1776): DIFFÉRENCIATION PAR ÉLECTROPHORÈSE ENZYMATIQUE DES ESPÈCES PARASITES DU TURBOT (*PSETTA MAXIMA*) ET DE LA BARBUE (*SCOPHTHALMUS RHOMBUS*). [THE COMPLEX *BOTHRIOCEPHALUS SCORPII* (MUELLER, 1776): DIFFERENTIATION OF THE PARASITIC STRAINS FROM THE TURBOT (*PSETTA MAXIMA*) AND THE BRILL (*SCOPHTHALMUS RHOMBUS*) BY ELECTROPHORETIC STUDIES ON ENZYMES.] *C.R. Hebd. Seances Acad. Sci. Ser. III Sci. Vie* 296(2):127-129. 17 Jan. 1983. In French with English summ. SFA 28(2)
[Lab. Parasitol. Comp., Univ. Sci. Tech., Languedoc, 34060 Montpellier, France]

83-001152 Tave, D.; J. E. Bartels and R. O. Smitherman. SADDLEBACK: A DOMINANT, LETHAL GENE IN *SAROTHERODON AUREUS* (STEINDACHNER) (= *TILAPIA AUREA*). *J. Fish Dis.* 6(1):59-73. Jan. 1983. SFA 28(2)
[Dep. Entomol. Fish. Wildl., Univ. Minn., St. Paul 55108]

OTHER DISEASES AND PARASITES (CONTINUED)

83-001153 Thulin, J. STRUCTURE AND FUNCTION OF THE FEMALE REPRODUCTIVE DUCTS OF THE FISH BLOOD-FLUKE *APOROCOTYLE SIMPLEX* ODHNER, 1900 (DIGENEA: SANGUINICOLIDAE). *Sarsia* 67(4):227-248. 1982. SFA 28(2)
[Natl. Swedish Environ. Prot. Board, Coastal Water Sect., Box 584, S-740 71 Oregrund, Sweden]

POLLUTION

83-001154 Baun, K. ALTERNATIVE METHODS OF ESTIMATING POLLUTANT LOADS IN FLOWING WATER. *Wis. Dep. Nat. Resour. Tech. Bull.* No. 133. 11p. 1982. SFA 28(2)

83-001155 Berge, J. A.; K. I. Johannessen and L. Reiersen. EFFECTS OF WATER SOLUBLE FRACTION OF NORTH SEA CRUDE OIL ON THE SWIMMING ACTIVITY OF THE SAND GOBY, *POMATOSCHISTUS MINUTUS* (PALLAS). *J. Exp. Mar. Biol. Ecol.* 68(2):159-167. 8 Apr. 1983. SFA 28(2)
[Inst. Mar. Biol. Limnol., Univ. Oslo, Oslo, Norway] Experiments were performed to test the effects of the water soluble fraction of North Sea crude oil (WSF) on the swimming behaviour of sand gobies, *Pomatoschistus minutus* Pallas). In clean sea water a normal activity pattern was noted with an "off bottom activity" in the dark and an "on bottom activity" in the light. After 1 to 2 days of exposure to WSF of oil (0.1 to 1.0 ppm) the "off bottom" activity was suppressed, and there was an increased mortality. A 50% survival was found after 6 days exposure to WSF. Gradual restoration of clean sea water to the surviving fish re-established the normal activity pattern, although some fish still died.

83-001156 Bousch, G. M. and J. R. Thieleke. MERCURY CONTENT IN SHARKS *Bull. Environ. Contam. Toxicol.* 30(3):284-290. Mar. 1983. SFA 28(2)
[Dep. Entomol., Univ. Wis., Madison 53706]

83-001157 Boush, G. M. and J. R. Thieleke. TOTAL MERCURY CONTENT IN YELLOWFIN AND BIGEYE TUNA. *Bull. Environ. Contam. Toxicol.* 30(3):291-297 Mar. 1983. SFA 28(2)
[Dep. Entomol., Univ. Wis., Madison 53706]

83-001158 Cooper, C. M.; L. A. Knight, Jr. and J. Herring. FISH COMPOSITION IN A SEDIMENT-LADEN MISSISSIPPI DELTA STREAM SYSTEM. *J. Miss. Acad. Sci.* 27:163-175. 1982. SFA 28(2)
[U.S. Dep. Agric. Sedimentation Lab., SEA-ARS, Oxford, MS 38655] A study of Bear Creek, a Mississippi River alluvial delta stream system, was conducted to investigate fisheries in an ecosystem with an intensively cultivated flatland watershed. Thirty-nine species of fishes were found, with gizzard shad *Dorosoma cepedianum* and bluegill *Lepomis macrochirus* the dominant species. Populations of most game species have been drastically reduced over the last 25 years and have been replaced by increased populations of rough fish (buffalo, carp) and other less economically desirable species. Although it is impossible to fully assess reasons for past damage, publicized factors such as pesticides have contributed to the decline of fisheries and an additional cause of the continuing decline appears to be excessive sedimentation.

83-001159 Flos, R.; M. C. Riva and J. Balasch. CHROMIUM AND POSTASSIUM ACCUMULATION INFLUENCED BY BODY WEIGHT IN GOLDFISH (*CARASSIUS AURATUS*) *Bull. Environ. Contam. Toxicol.* 30(3):331-336. Mar. 1983. SFA 28(2)

POLLUTION (CONTINUED)

83-001159 CONTINUED
[Fisiol. Anim., Fac. Ciencias Univ. Autónoma Barcelona, Bellaterra, Spain]

83-001160 Gossett, R. W.; H. W. Puffer; R. H. Arthur, Jr. and D. R. Young. DDT, PCB AND BENZO(A)PYRENE LEVELS IN WHITE CROAKER (*GENYONEMUS LINEATUS*) FROM SOUTHERN CALIFORNIA. *Mar. Pollut. Bull.* 14(2):60-65. Feb. 1983. SFA 28(2)
[South. Calif. Coastal Water Res. Proj., 646 W. Pacific Coast Highway, Long Beach 90806]

83-001161 Hall, L. W., Jr. D. T. Burton; S. T. Margrey and W. C. Graves. THE INFLUENCE OF SPRING AND FALL TEMPERATURES ON THE AVOIDANCE RESPONSE OF JUVENILE ATLANTIC MENHADEN, *BREVOORTIA TYRANNUS*, EXPOSED TO SIMULTANEOUS CHLORINE-ΔT CONDITIONS. *Water Resour. Bull.* 19(2):283-287. Apr. 1983. SFA 28(2)
[Aquatic Ecol. Sect., Appl. Phys. Lab., Johns Hopkins Univ., Shady Side, MD 20764] The avoidance response of groups of juvenile Atlantic menhaden, *Brevoortia tyrannus*, was evaluated by exposing test species to a range of simultaneous total residual chlorine (TRC) (0.00, 0.05, 0.10, and 0.15 mg/L) and elevated temperature (0, 2, 4, and 6°C) conditions simulating power plant discharges. This species was tested at both 15 and 20°C to determine possible effects of acclimation temperature on the avoidance response. These temperatures were selected to represent spring or fall thermal conditions when most East Coast power plant facilities initiate power plant chlorination in the spring or terminate the use of this biocide in the fall. An unbalanced 3-factor factorial design was used to develop response surface avoidance models at 15 and 20°C. The model developed at 15°C showed: (1) an increase in avoidance occurred at all ΔT conditions as TRC increased from 0.00 to 0.05 mg/L; (2) a greater degree of avoidance occured at TRC concentrations above 0.05 mg/L at all ΔT conditions; and (3) TRC was the most important term influencing avoidance. The model for Atlantic menhaden at 20°C showed: (1) avoidance increased with increasing TRC concentration at each ΔT condition; (2) avoidance did not necessarily increase with increasing ΔT's at each TRC concentration; (3) greatest avoidance occurred at 0°C ΔT and 0.15 mg/L TRC; and (4) TRC was the most important term influencing avoidance. There was a significant difference ($p<0.00001$) between avoidance models at 15 and 20°C. However, when extreme conditions of 0.15 mg/L TRC and 0-6°C ΔT were compared, the degree of avoidance responses (percent time in control area) was similar.

83-001162 Hoeppel, R. E. and H. E. Westerdahl. DISSIPATION OF 2,4-D DMA AND BEE FROM WATER, MUD, AND FISH AT LAKE SEMINOLE, GEORGIA. *Water Resour. Bull.* 19(2):197-204. Apr. 1983. SFA 28(2)
[Environ. Lab., USAE Waterways Exp. Stn., Vicksburg, MS 39180]

83-001163 Insalaco, S. E.; J. C. Makarewicz and J. N. McNamara. THE INFLUENCE OF SEX, SIZE, AND SEASON ON MIREX LEVELS WITHIN SELECTED TISSUES OF LAKE ONTARIO SALMON. *J. Great Lakes Res.* 8(4):660-665. 1982. SFA 28(2)
[Analytical Services Div., O.H. Materials Co., Findlay, OH 45840]

83-001164 Itzkowitz, N.; J. R. Schubel and P. M. J. Woodhead. RESPONSES OF SUMMER FLOUNDER, *PARALICHTHYS DENTATUS*, EMBRYOS TO THERMAL SHOCK. *Environ. Biol. Fishes* 8(2):125-135. 1 Feb. 1983. SFA 28(2)
[Mar. Sci. Res. Cent., State Univ. N.Y., Stony Brook 11794] Summer flounder eggs, fertilized artificially, were exposed to time series of abrupt thermal shocks and examined for lethal and sublethal effects. The temperature

POLLUTION (CONTINUED)

83-001164 CONTINUED increments (ΔTs) ranged from 8° to 20°C above the holding temperature, the periods of exposure to the ΔTs were for 2,4,8 and 16 minutes. Eggs were exposed at early embryo and late embryo stages of development. The eggs were found highly resistant to thermal shock, early embryo stage eggs survived the highest temperature-time exposure used, at ΔT 20°C for 16 minutes; late embryo stage eggs showed significantly increased mortalities in the region of ΔT 16°C for 16 minutes and ΔT 18°C for 2 minutes and at all higher temperature exposures. Larvae hatching from the late embryo stage eggs after thermal shock were examined for anomalous anatomical development. A pattern of increasing incidence of developmental anomalies appeared at ΔT 14°C after exposures of between 4 and 8 minutes. Such sublethal effects probably lead quickly to larval death from starvation, predation, etc., and must be taken into consideration in assessing effects of thermal shock.

83-001165 Jeon, S. R. and I. S. Kim. THE WATER POLLUTION AND ITS INFLUENCE ON THE FISH COMMUNITY IN THE BRACKISHWATER AREAS OF SEVERAL RIVERS IN KOREA. *Bull. Korean Assoc. Conserv. Nat.* 3:269-277. 1981. In Korean with English summ. SFA 28(2)
[Dep. Biol., Sang Myung Women's Teachers Coll., Korea]

83-001166 Johnson, R. E., (ed.). ACID RAIN/FISHERIES. *Proc. Int. Symp. Acidic Precipitation Fish. Impacts Northeast. North Am.* viii + 357p. 1982. Available from Am. Fish. Soc., 5410 Grosvenor Lane, Bethesda, MD 20014. SFA 28(2)

83-001167 Kiørboe, T.; F. Møhlenberg and H. U. Riisgård. MERCURY LEVELS IN FISH, INVERTEBRATES AND SEDIMENT IN A RECENTLY RECORDED POLLUTED AREA (NISSUM BROAD, WESTERN LIMFJORD, DENMARK). *Mar. Pollut. Bull.* 14(1):21-24. Jan. 1983. SFA 28(2)
[Roskilde Univ. Cent., Inst. Biol., P.O. Box 260, DK-4000 Roskilde, Denmark]

83-001168 Kyle, J. H. and N. Ghani. MERCURY CONCENTRATIONS IN TEN SPECIES OF FISH FROM LAKE MURRAY, WESTERN PROVINCE. *Sci. New Guinea* 9(1):48-58. Apr. 1982. SFA 28(2)
[Chem. Dep., Univ. Papua New Guinea, Papua New Guinea]

83-001169 Larimore, R. W. and J. A. Tranquilli, (eds.). THE LAKE SANGCHRIS STUDY: CASE HISTORY OF AN ILLINOIS COOLING LAKE. *Ill. Nat. Hist. Surv. Bull.* 32(4):279-737. Aug. 1981. SFA 28(2)
[Ill. Inst. Nat. Resour., Nat. Hist. Surv. Div., Champaign]

83-001170 Lemly, A. D. DETERMINATION OF SELENIUM IN FISH TISSUES WITH DIFFERENTIAL PULSE POLAROGRAPHY. *Environ. Technol. Lett.* 3(11):497-502. Nov. 1982. SFA 28(2)
[Dep. Biol., Wake Forest Univ., Winston-Salem, NC 27109]

83-001171 MacCrimmon, H. R.; C. D. Wren and B. L. Gots. MERCURY UPTAKE BY LAKE TROUT, *SALVELINUS NAMAYCUSH*, RELATIVE TO AGE, GROWTH, AND DIET IN TADENAC LAKE WITH COMPARATIVE DATA FROM OTHER PRECAMBRIAN SHIELD LAKES. *Can. J. Fish. Aquatic Sci.* 40(2):114-120. Feb. 1983. SFA 28(2)
[Dep. Zool., Univ. Guelph, Guelph, ON N1G 2W1, Canada]

POLLUTION (CONTINUED)

83-001172 Mackenzie, B. J. BIBLIOGRAPHY OF TRACE METALS IN MARINE AND ESTUARINE ECOSYSTEMS, 1977 TO 1981. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1146. iv + 20p. Feb. 1983. In English with French summ. SFA 28(2)
[Dep. Fish. Oceans, Winnipeg, MB R3T 2N6, Canada]

83-001173 Matthews, A. D. MERCURY CONTENT OF COMMERCIALLY IMPORTANT FISH OF THE SEYCHELLES, AND HAIR MERCURY LEVELS OF A SELECTED PART OF THE POPULATION. *Environ. Res.* 30(2):305-312. Apr. 1983. SFA 28(2)
[Trop. Prod. Inst., 56/62 Gray's Inn Rd., London WC1X 8LU, England]

83-001174 Morgan, R. P. II, V. J. Rasin, Jr. and L. A. Noe. SEDIMENT EFFECTS ON EGGS AND LARVAE OF STRIPED BASS AND WHITE PERCH. *Trans. Am. Fish. Soc.* 112(2A):220-224. Mar. 1983. SFA 28(2)
[Appl. Environ. Lab., Cent. Environ. Estuarine Stud., Univ. Md., Frostburg, MD 21532]

83-001175 Niimi, A. J. BIOLOGICAL AND TOXICOLOGICAL EFFECTS OF ENVIRONMENTAL CONTAMINANTS IN FISH AND THEIR EGGS. *Can. J. Fish. Aquatic Sci.* 40(3):306-312. Mar. 1983. In English with French summ. SFA 28(2)
[Can. Cent. Inland Waters, Burlington, ON L7R 4A6, Canada]

83-001176 Pennington, C. H.; J. A. Baker and M. E. Potter. CONTAMINANT LEVELS IN FISHES FROM BROWN'S LAKE, MISSISSIPPI. *J. Miss. Acad. Sci.* 27:139-147. 1982. SFA 28(2)
[USAE Waterways Exp. Stn., Vicksburg, MS 39180]

83-001177 Powell, J. H. and D. R. Fielder. TEMPERATURE AND ACCUMULATION OF DDT BY SEA MULLET (*MUGIL CEPHALUS* L.). *Mar. Pollut. Bull.* 14(1):17-21. Jan. 1983. SFA 28(2)
[Dep. Zool., Univ. Queensland, St. Lucia 4067, Australia] Accumulation of tech-DDT by the sea mullet *Mugil cephalus* L. was investigated at 15, 20, 25 and 30°C. Tissue residues of *p,p'*-DDT in fish increased with temperature reflecting an increase in metabolic rate. Metabolic degradation of *p,p'*-DDT to *p,p'*-DDD was also indicated. Rate of uptake of *p,p'*-DDT (mg kg^{-1} h^{-1}) was not positively correlated with temperature and decreased with time at 15, 25 and 30°C. These results suggest that the uptake of DDT from water can be regulated by *M. cephalus*.

83-001178 Rohrer, T. K.; J. C. Forney and J. H. Hartig. ORGANOCHLORINE AND HEAVY METAL RESIDUES IN STANDARD FILLETS OF COHO AND CHINOOK SALMON OF THE GREAT LAKES - 1980. *J. Great Lakes Res.* 8(4):623-634. 1982. SFA 28(2)
[Off. Toxic Materials Control, Mich. Dep. Nat. Resour., Lansing 48909]

83-001179 Schindler, D. W. and T. Ruszczynski. A TEST OF LIMNOLOGICAL DATA FROM THE EXPERIMENTAL LAKES AREA, NORTHWESTERN ONTARIO, FOR EVIDENCE OF ACIDIFICATION. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1147. iv + 17p. Feb. 1983. SFA 28(2)
[Dep. Fish. Oceans, Winnipeg, MB R3T 2N6, Canada]

83-001180 Spigarelli, S. A.; M. M. Thommes; W. Prepejchal and R. M. Goldstein. SELECTED TEMPERATURES AND THERMAL EXPERIENCE OF BROWN TROUT, *SALMO TRUTTA*, IN A STEEP THERMAL GRADIENT IN NATURE. *Environ. Biol.*

POLLUTION (CONTINUED)

83-001180 CONTINUED *Fishes* 8(2):137-149. 1 Feb. 1983. SFA 28(2)
[Ecol. Sci. Sect., Radiol. Environ. Res. Div., Argonne Natl. Lab. Argonne, IL 60439] Adult brown trout were captured near a thermal discharge tagged with radiotransmitters, released at the point of capture and tracke from a stationary position to determine plume-use and temperature selectio over the annual cycle. Patterns of residence and temperature selection i the thermal gradient were highly variable both within and among seasons Residence in the gradient and dispersion of body temperatures (T_b) decreased with increased ambient temperature while selected temperature and skewness of body temperature distributions were directly related t ambient temperature. The variability of responses and the apparen partitioning of thermal habitat among adult brown trout were functions o sex, date and forage density, as well. On an annual basis, brown trou selected a modal temperature of 12°C, the reported optimum metaboli temperature for the species. The upper preferred temperature for adul brown trout in Lake Michigan is estimated to be 16°C. Male and female trou often selected similar temperatures, but in late summer females selecte 18°C and demonstrated negative skewness while males selected 15°C with hig positive skewness. The reverse was true in October when the selecte temperature of males was 18°C (females, 12°C), and the distribution of mal body temperatures was negatively skewed. Brown trout spent more time in the heated gradient during winter, spring, and fall, resulting in hig dispersions of body temperature compared to fish at ambient temperature Thermal niche breadth (dispersion of T_b) of plume-resident fish was 3.5°C o an annual basis, while the annual dispersion of water temperatures i ambient areas (T_a) was 4.1°C. Over the short term (months) dispersion in T was considerably higher than dispersion in T_a.

83-001181 Sullivan, J. R.; J. J. Delfino; C. R. Buelow and T. B. Sheffy POLYCHLORINATED BIPHENYLS IN THE FISH AND SEDIMENT OF THE LOWER FOX RIVER WISCONSIN. *Bull. Environ. Contam. Toxicol.* 30(1):58-64. Jan. 1983. SF 28(2)
[Dep. Environ. Eng. Sci., Univ. Fla., Gainesville 32611]

TOXICOLOGY; BIOASSAYS

83-001182 Alabaster, J. S.; D. G. Shurben and M. J. Mallett. THE ACUT LETHAL TOXICITY OF MIXTURES OF CYANIDE AND AMMONIA TO SMOLTS OF SALMON *SALMO SALAR* L. AT LOW CONCENTRATIONS OF DISSOLVED OXYGEN. *J. Fish Biol.* 22(2):215-222. Feb. 1983. SFA 28(2)
[Pollut. Fish., 1 Granby Rd., Stevenage, Hertshire, England] The survival of Atlantic salmon smolts on exposure to constant concentrations of cyanide and ammonia, singly and together, has been measured under laboratory conditions at a concentration of 5 mgl^{-1} of carbon dioxide. The 24-h LC50 values of cyanide and of un-ionised ammonia, in fresh water, were 0.073 mg HCN l^{-1} and 0.20 mg NH_3 l^{-1} respectively at a concentration of dissolved oxygen of 10 mg l^{-1}, and 0.024 mg HCN l^{-1} and 0.08 mg NH_3 l^{-1} respectively at a concentration of dissolved oxygen of 3.5 mgl^{-1}. In 30% sea water the corresponding values were similar for cyanide but markedly higher for ammonia. In 80% sea water the values were intermediate between those of fresh water and 30% sea water. Prior acclimation of the fish to the respective toxicant increased the resistance of the fish only slightly to cyanide, but with ammonia the 24-h LC50 was increased between 1.4 and 2-fold after acclimation for 1-3 days to between 0.2 and 0.5 of the 24-h LC50 value. Mixtures of cyanide and ammonia were between 0.6 and 1.25 times as toxic as expected, assuming simple additivity of toxicity.

TOXICOLOGY; BIOASSAYS (CONTINUED)

83-001183 Andreasen, J. K. and R. W. Spears. TOXICITY OF TEXAN PETROLEUM WELL BRINE TO THE SHEEPSHEAD MINNOW (*CYPRINODON VARIEGATUS*), A COMMON ESTUARINE FISH. *Bull. Environ. Contam. Toxicol.* 30(3):277-283. Mar. 1983. SFA 28(2)
[U.S. FWS, Columbia Natl. Fish Res. Lab. Field Stn., P.O. Box 2087, Victoria, TX 77902]

83-001184 Borthwick, P. W. and J. M. Patrick, Jr. USE OF AQUATIC TOXICOLOGY AND QUANTITATIVE CHEMISTRY TO ESTIMATE ENVIRONMENTAL DEACTIVATION OF MARINE-GRADE CREOSOTE IN SEAWATER. *Environ. Technol. Chem.* 1(4):281-288. 1982. SFA 28(2)
[Environ. Res. Lab., U.S. EPA, Gulf Breeze, FL 32561]

83-001185 Call, D. J.; L. T. Brooke; R. J. Kent; M. L. Knuth; C. Anderson and C. Moriarity. TOXICITY, BIOCONCENTRATION, AND METABOLISM OF THE HERBICIDE PROPANIL (3',4'-DICHLOROPROPIONANILIDE) IN FRESHWATER FISH. *Arch. Environ. Contam. Toxicol.* 12(2):175-182. Mar. 1983. SFA 28(2)
[Cent. Lake Superior Environ. Stud., Univ. Wis., Superior 54880] Fathead minnows (*Pimephales promelas*) were exposed to technical grade propanil (3',4'-dichloropropionanilide) in a flow-through diluter system to determine acute lethality. LC_{50} values were 11.5, 10.2, 8.6, and 3.4 $mg \cdot L^{-1}$ at 24, 48, 96, and 192 hr, respectively. Eggs, newly hatched fry, and juvenile fish of this species were similarly exposed but at lower concentrations and for a period of 58 days. The 58-day "no effect" concentration was between 0.4 and 0.6 $\mu g \cdot L^{-1}$, based upon the physiological parameters of length and dry weight of juvenile fish. ^{14}C-Propanil did not bioconcentrate significantly in fathead minnows (1.6X for parent propanil in whole body). Rainbow trout (*Salmo gairdneri*) readily metabolized propanil, forming at least ten products. One metabolite recovered from trout bile was identified as either 3',4'-dichloro-2-hydroxypropionanilide or 3',4'-dichloro-3-hydroxypropionanilide. The technical grade propanil also contained 0.67 $mg \cdot g^{-1}$ of 3, 3',4,4'-tetrachloroazobenzene as a contaminant.

83-001186 Carpenter, L. A. and D. L. Eaton. THE DISPOSITION OF 2,4-DICHLOROPHENOXYACETIC ACID IN RAINBOW TROUT. *Arch. Environ. Contam. Toxicol.* 12(2):169-173. Mar. 1983. SFA 28(2)
[D.L. Eaton: Univ. Wash., Dep. Environ. Health, Seattle, WA 98195]

83-001187 Crespo, S. and K. J. Karnaky, Jr. COPPER AND ZINC INHIBIT CHLORIDE TRANSPORT ACROSS THE OPERCULAR EPITHELIUM OF SEAWATER-ADAPTED KILLIFISH *FUNDULUS HETEROCLITUS*. *J. Exp. Biol.* 102:337-341. Jan. 1983. SFA 28(2)
[Dep. Biol., Fac. Vet., Univ. Autonoma Barcelona, Bellaterra, Barcelona, Spain]

83-001188 Duncan, D. A. and J. F. Klaverkamp. TOLERANCE AND RESISTANCE TO CADMIUM IN WHITE SUCKERS (*CATOSTOMUS COMMERSONI*) PREVIOUSLY EXPOSED TO CADMIUM, MERCURY, ZINC, OR SELENIUM. *Can. J. Fish. Aquatic Sci.* 40(2):128-138. Feb. 1983. SFA 28(2)
[Freshwater Inst., 501 University Crescent, Winnipeg, MT R3T 2N6, Canada]

83-001189 Fingerman, S. W. and E. C. Short, Jr. CHANGES IN NEUROTRANSMITTER LEVELS IN CHANNEL CATFISH AFTER EXPOSURE TO BENZO(A)PYRENE, NAPHTHALENE, AND AROCLOR 1254. *Bull. Environ. Contam. Toxicol.*

TOXICOLOGY; BIOASSAYS (CONTINUED)

83-001189 CONTINUED 30(2):147-151. Feb. 1983. SFA 28(2)
[Dep. Physiol. Sci., Coll. Vet. Med., Okla. State Univ., Stillwater 74078]

83-001190 Fingerman, S. W.; L. A. Brown; M. Lynn and E. C. Short, Jr. RESPONSES OF CHANNEL CATFISH TO XENOBIOTICS: INDUCTION AND PARTIAL CHARACTERIZATION OF A MIXED FUNCTION OXYGENASE. *Arch. Environ. Contam. Toxicol.* 12(2):195-201. Mar. 1983. SFA 28(2)
[Dep. Physiol. Sci., Coll. Vet. Med., Okla. State Univ., Stillwater 74078]

83-001191 Fisher, J. W.; R. A. Dilego; M. E. Putnam; J. M. Livingston and D. L. Geiger. BIOLOGICAL MONITORING OF BLUEGILL ACTIVITY. *Water Resour. Bull.* 19(2):211-215. Apr. 1983. SFA 28(2)
[Environ. Qual. Br., Toxic Hazards Div., Wright-Patterson Air Force Base, Dayton, OH 45433] Bluegills were exposed for one hour to 0.2 or 2.3 mg/liter water soluble fraction (WSF) of JP-4 in a testing chamber designed to contain individual fish. A strain gage paddle was used to monitor activity. Whole body movement of individual fish did not change appreciably during exposure to either 0.2 or 2.3 mg/liter WSF-JP-4. Strength of pectoral fin movement, accounting for the majority of the fish behavior, increased in six of ten individuals exposed to 2.3 mg/liter WSF-JP-4. Pectoral fanning may be a useful parameter to indirectly assess water quality.

83-001192 Fugelli, K. and T. Vislie. PHYSIOLOGICAL RESPONSE TO ACID WATER IN BROWN TROUT (*SALMO TRUTTA* L.): CELL VOLUME REGULATION IN HEART VENTRICLE TISSUE. *J. Exp. Biol.* 101:71-82. Dec. 1982. SFA 28(2)
[Inst. Zoophysiol., Odense Univ., DK5230 Odense M, Denmark]

83-001193 Gilderhus, P. A. and R. M. Burress. SELECTIVE CONTROL OF COMMON CARP: INEFFECTIVENESS OF 2-(DIGERANYLAMINO)-ETHANOL (GD-174) IN POND TRIALS. *N. Am. J. Fish. Manage.* 3(1):61-66. 1983. SFA 28(2)
[U.S. FWS, Natl. Fish. Res. Lab., P.O. Box 818, La Crosse, WI 54601]

83-001194 Hall, L. W., Jr.; D. T. Burton; S. L. Margrey and W. C. Graves. THE EFFECT OF ACCLIMATION TEMPERATURE ON THE INTERACTIONS OF CHLORINE, ΔT AND EXPOSURE DURATION TO EGGS, PROLARVAE AND LARVAE OF STRIPED BASS, *MORONE SAXATILIS*. *Water Res.* 17(3):309-317. 1983. SFA 28(2)
[Johns Hopkins Univ., Appl. Phys. Lab., Aquatic Ecol. Sect., Shady Side, MD 20764] The effect of five acclimation temperature on the interactions of total residual chlorine (TRC) (0.00, 0.15 and 0.30 mgl^{-1}), ΔT(2,6,10°C above acclimation temperature) and exposure duration (0.08, 2.0,4.0H) conditions were evaluated for stroped bass, *Morone saxatilis*, eggs, prolarvae and larvae. The range of acclimation temperatures (12.5,15.0, 17.5, 20.0, 22.5°C for eggs and prolarvae; 15.0, 17.5, 20.0, 22.5 and 25.0°C for larvae) tested with each life stage included the lower, optimum and upper environmental temperatures that exist when these life stages may be subjected to power plant chlorination conditions. All organisms were tested using a fractional composite design in a 3X3X3 factorial matrix. Mortality of the eggs was highest at temperatures below 17.5°C; overall mortality decreased with increasing acclimation temperature. The factor causing the greatest effect with this developmental stage was ΔT, followed by TRC and exposure time. Mortality of striped bass prolarvae increased with acclimation temperature after exposure to interacting treatment factors. Interactions involving TRC were most important from 12.5 to 17.5°C; ΔT interactions were prominent at acclimation temperatures of 20.0 and 22.5°C. Larvae mortality was highest at 20°C with a gradual decrease at 25.0°C. Interations involving ΔT, TRC and exposure time all contributed to the mortality of

TOXICOLOGY; BIOASSAYS (CONTINUED)

83-001194 CONTINUED this life stage; TRC and ΔT caused the main effects. Striped bass eggs were the most resistant life stage; mean mortality averaged over all acclimation temperatures was approximately the same for prolarvae and larvae.

83-001195 Hawkins, W. E.; R. M. Overstreet and M. J. Provancha. HISTOLOGICAL EFFECTS OF SPACE SHUTTLE LAUNCH TOXICANTS ON FISHES. *Fla. Sci.* 46(Suppl. 1):18-19. 1983. Abstract only. SFA 28(2)
[Gulf Coast Res. Lab., Ocean Springs, MS 39564] During launches of the space shuttle from Kennedy Space Center, fish kills in nearby lagoons have occurred. Preliminary histopathological studies were conducted on control and exposed specimens of the mosquitofish, *Gambusia affinis*, and sailfin molly, *Poecilia latipinna*. Gills of control fish failed to exhibit gill damage, however, exposed specimens showed a spectrum of changes. These anomolies varied both among different specimens and among gills of individual specimens. Mild changes included lifting of the outer epithelial layer of the gill to more severe cases involving the erosion of gill lamellae with hemostasis in both afferent and efferent gill vessels. Pericardial edema was observed in the severe cases. In summary, fish subjected to drastic environmental alteration involving pH changes and possible metal intoxication exhibited histopathological alterations sufficient to kill them.

83-001196 Henderson, V.; J. W. Fisher; R. D'Allessandris and J. M. Livingston. EFFECTS OF HYDRAZINE ON FUNCTIONAL MORPHOLOGY OF RAINBOW TROUT EMBRYOS AND LARVAE. *Trans. Am. Fish. Soc.* 112(1):100-104. Jan. 1983. SFA 28(2)
[Biol. Dep., Grambling State Univ., Grambling, LA 71245]

83-001197 Holt, G. J. and C. R. Arnold. EFFECTS OF AMMONIA AND NITRITE ON GROWTH AND SURVIVAL OF RED DRUM EGGS AND LARVAE. *Trans. Am. Fish. Soc.* 112(2B):314-318. Mar. 1983. SFA 28(2)
[Univ. Tex. Port Aransas Mar. Lab., Port Aransas 78373]

83-001198 Kenaga, E. E. PREDICTABILITY OF CHRONIC TOXICITY FROM ACUTE TOXICITY OF CHEMICALS IN FISH AND AQUATIC INVERTEBRATES. *Environ. Technol. Chem.* 1(4):347-358. 1982. SFA 28(2)
[Health Environ. Stud., Dow Chemical Co., Midland, MI 48640]

83-001199 Kjøsvik, E.; L. J. Sæthre and S. Lønning. EFFECTS OF SHORT-TERM EXPOSURE TO XYLENES ON THE EARLY CLEAVAGE STAGES OF COD EGGS (*GADUS MORHUA* L.). *Sarsia* 67(4):299-308. 1982. SFA 28(2)
[Inst. Biol. Geol., Univ. Tromsö, P.O.B. 3085, N-9001 Tromsö, Norway]

83-001200 Klocek, R. and D. Gordon. THE USE OF HIGH LEVELS OF QUINALDINE AS A FISH ANESTHETIC. *Proc. Annu. Conf. Am. Assoc. Zool. Parks Aquariums* 1982:58-64. 1982. SFA 28(2)
[John G. Shedd Aquarium, Chicago, IL]

83-001201 Layiwola, P. J.; D. F. C. Linnecar and B. Knights. HYDROLYSIS OF THE BILIARY GLUCURONIC ACID CONJUGATE OF PHENOL BY THE INTESTINAL MUCUS/FLORA OF GOLDFISH (*CARASSIUS AURATUS*). *Xenobiotica* 13(1):27-29. Jan. 1983. SFA 28(2)
[Div. Life Sci., Polytech. Cent. Lond., 115 New Cavendish St., London W1M 8JS, England]

TOXICOLOGY; BIOASSAYS (CONTINUED)

83-001202 Lee, R. M.; S. D. Gerking and B. Jezierska. ELECTROLYTE BALANCE AND ENERGY MOBILIZATION IN ACID-STRESSED RAINBOW TROUT, *SALMO GAIRDNERI* AND THEIR RELATION TO REPRODUCTIVE SUCCESS. *Environ. Biol. Fishes* 8(2):115-123. 1 Feb. 1983. SFA 28(2)

[S.D. Gerking: Dep. Zool., Ariz. State Univ., Tempe 85287] The main objective of the research was to learn whether selected physiological responses could be used as symptoms of forthcoming reproductive impairment in fishes subjected to acid stress. Electrolyte balance (Na^+, Cl^-) in blood and muscle, plasma osmotic pressure, internal water balance, blood glucose and liver glycogen were the most important parameters measured in rainbow trout, *Salmo gairdneri*, exposed for two-three weeks at six pH levels: 8.3, 7.7, 7.0, 6.2, 4.8, 4.2. In general, plasma and muscle Na^+/Cl^- and plasma osmotic pressure declined sharply at higher acidities while energy mobilization responded in the opposite fashion. The data were interpreted in terms of zones of tolerance and resistance. The zone of tolerance lies between pH 9.0 and 5.0, while the zone of resistance extends beyond pH 5.0. Complete regulation of physiological parameters occurred between the highest measured pH, 8.3, and 6.0. The limits of partial regulation and loss of regulation were tentatively set between pH 6.0 and 5.0 for the former and beyond 5.0 for the latter. Environmental and genetic factors are known to shift these limits. Reproductive stress occupies a zone between pH 5.5 and 6.5, according to laboratory and field observation on several species. The zone of reproductive stress overlaps the limits of complete and partial regulation. The physiological parameters therefore, would not be expected to exhibit consistently recognizable and dependable changes that would be useful to forcast reproductive failure. Severe acid stress could be diagnosed with the symptoms, however. A field test of the findings was provided by blood and tissue samples of white suckers, *Catostomus commersoni*, from an acidified (pH5.2) and an unacidified (pH 7.2) lake in the Adirondack Mountains, Herkimer County, New York. Changes in electrolytes and glucose-glycogen, predicted from the laboratory experiments, were noticed in fish from the acidified lake, although the changes were not striking. These fish may have been in a physiological state of partial regulation within the zone of tolerance.

83-001203 Lewis, A. G. and W. R. Cave. THE BIOLOGICAL IMPORTANCE OF COPPER IN OCEANS AND ESTUARIES. *Oceanogr. Mar. Biol.* 20:471-695. 1982. SFA 28(2)

[Dep. Oceanogr., Univ. British Columbia, Vancouver, BC, Canada]

83-001204 Loekle, D. M.; A. J. Schecter and J. J. Christian. EFFECTS OF CHLOROFORM, TETRACHLOROETHYLENE, AND TRICHLOROETHYLENE ON SURVIVAL, GROWTH, AND LIVER OF *POECILIA SPHENOPS*. *Bull. Environ. Contam. Toxicol.* 30(2):199-205. Feb. 1983. SFA 28(2)

[Dep. Biol. Sci., State Univ. N.Y., Binghamton 13901]

83-001205 MacFarlane, R. B. and R. J. Livingston. EFFECTS OF ACIDIFIED WATER ON THE LOCOMOTOR BEHAVIOR OF THE GULF KILLIFISH, *FUNDULUS GRANDIS*: A TIME SERIES APPROACH. *Arch. Environ. Contam. Toxicol.* 12(2):163-168. Mar. 1983. SFA 28(2)

[NMFS, Tiburon Lab., 3150 Paradise Dr., Tiburon, CA 94920] Locomotor activity of *Fundulus grandis* was monitored hourly at four pH levels (7.8, 6.5, 5.0, and 4.0) for 96 hr using infrared photoelectric detection. As an internal control, the activity pattern of each fish was followed for 96hr in pH 7.8 prior to acidification. Rhythmicity of activity patterns was progressively reduced with increased acidification. Fish became hyperactive in low pH water, particularly during the normal diurnal inactive period in pH 5.0 and 4.0. Time series analysis allowed quantitative determination of the effects of acidity on the normal diel activity pattern and suggested a useful method for detection of subtle changes in an activity regime in response to stress.

TOXICOLOGY; BIOASSAYS (CONTINUED)

83-001206 Mishra, J. and A. K. Srivastava. MALATHION INDUCED HEMATOLOGICAL AND BIOCHEMICAL CHANGES IN THE INDIAN CATFISH *HETEROPNEUSTES FOSSILIS*. *Environ. Res.* 30(2):393-398. Apr. 1983. SFA 28(2)
[Dep. Zool., Univ. Gorakhpur, Gorakhpur 273001, Uttar Pradesh, India]

83-001207 Mitchell, S. J. and J. J. Cech, Jr. AMMONIA-CAUSED GILL DAMAGE IN CHANNEL CATFISH (*ICTALURUS PUNCTATUS*): CONFOUNDING EFFECTS OF RESIDUAL CHLORINE. *Can. J. Fish. Aquatic Sci.* 40(2):242-247. Feb. 1983. SFA 28(2)
[Wildl. Fish. Br., Univ. Calif., Davis 95616]

83-001208 Moles, A. and S. D. Rice. EFFECTS OF CRUDE OIL AND NAPHTHALENE ON GROWTH, CALORIC CONTENT, AND FAT CONTENT OF PINK SALMON JUVENILES IN SEAWATER. *Trans. Am. Fish. Soc.* 112(2A):205-211. Mar. 1983. SFA 28(2)
[NMFS, P.O. Box 155, Auke Bay, AK 99821]

83-001209 Mrowka, W. DIETHYLPROPION DECREASES FOOD INTAKE IN FISH. *Experientia (Basel)* 39(3):289-290. 15 Mar. 1983. SFA 28(2)
[Zool. Inst., Tech. Univ. Braunschweig, Pockelsstr. 10a, D-3300 Braunschweig, West Germany] Daily food intake of 5 specimens of *Haplochromis burtoni*, measured in a 30-min feeding session, was reduced by the application of water solutions of 2 and 4 mg/l diethylpropion (2-diethylamino-propiophenon).

83-001210 Peterson, R. H.; J. L. Metcalfe and S. Ray. EFFECTS OF CADMIUM ON YOLK UTILIZATION, GROWTH, AND SURVIVAL OF ATLANTIC SALMON ALEVINS AND NEWLY FEEDING FRY. *Arch. Environ. Contam. Toxicol.* 12(1):37-44. Jan. 1983. SFA 28(2)
[Fish. Environ. Sci., Dep. Fish. Oceans, Biol. Stn., St. Andrews, NB E0G 2X0, Canada] Growth and the yolk-to-embryo gross conversion efficiencies were determined for Atlantic salmon (*Salmo salar* L.) alevins and fry reared under control conditions and at 0.2 and 2.0 ppb cadmium (Cd). Alevins reared at 2.0 ppb Cd grew more slowly than controls and alevins reared at 0.2 ppb. The size reduction was due primarily to reduction in yolk-conversion efficiency during the latter half of yolk absorption. The rate of yolk uptake was also reduced at 2.0 ppb Cd. Mortality of feeding fry reared up to one month at 2.0 ppb Cd was 80 to 90%. Fry previously reared in 2.0 ppb Cd as alevins experienced lower mortality than those introduced to Cd at start of feeding. Mortality was preceded by hyperactivity and convulsions; 30 to 60% of fry exposed to 2.0 ppb Cd developed cranial swellings. Growth of fry surviving 2.0 ppb Cd for one month was severely retarded. There were no adverse effects from 0.2 ppb Cd.

83-001211 Plumb, J. A.; T. E. Schwedler and C. Limsuwan. EXPERIMENTAL ANESTHESIA OF THREE SPECIES OF FRESHWATER FISH WITH ETOMIDATE. *Prog. Fish-Cult.* 45(1):30-33. Jan. 1983. SFA 28(2)
[Dep. Fish. Allied Aquacult., Ala. Agric. Exp. Stn., Auburn Univ., Auburn, AL 36849]

83-001212 Ram, R. N. and A. G. Sathyanesan. EFFECT OF MERCURIC CHLORIDE ON THE REPRODUCTIVE CYCLE OF THE TELEOSTEAN FISH *CHANNA PUNCTATUS*. *Bull. Environ. Contam. Toxicol.* 30(1):24-27. Jan. 1983. SFA 28(2)
[Cent. Exp. Med. Surg., Inst. Med. Sci., Banaras Hindu Univ., Varanasi-221005, India]

TOXICOLOGY; BIOASSAYS (CONTINUED)

83-001213 Sastry, K. V. and A. A. Siddiqui. METABOLIC CHANGES IN THE SNAKE HEAD FISH *CHANNA PUNCTATUS* CHRONICALLY EXPOSED TO ENDOSULFAN. *Water Air Soil Pollut.* 19(2):133-141. Feb. 1983. SFA 28(2)
[Environ. Toxicol. Lab., Dep. Zool., D.A.V. (P.G.) COLL., Muzaffarnager-251001, India]

83-001214 Schwedler, T. E. and C. S. Tucker. EMPIRICAL RELATIONSHIP BETWEEN PERCENT METHEMOGLOBIN IN CHANNEL CATFISH AND DISSOLVED NITRITE AND CHLORIDE IN PONDS. *Trans. Am. Fish. Soc.* 112(1):117-119. Jan. 1983. SFA 28(2)
[Miss. Coop. Ext. Serv., Stoneville 38776]

83-001215 Shea, T. B. and E. S. Berry. TOXICITY AND INTRACELLULAR LOCALIZATION OF CARBARYL AND 1-NAPHTHOL IN CELL CULTURES DERIVED FROM GOLDFISH. *Bull. Environ. Contam. Toxicol.* 30(1):99-104. Jan. 1983. SFA 28(2)
[Dep. Biol., Northeastern Univ., Boston, MA 02115]

83-001216 Srivastava, A. K. and J. Mishra. EFFECTS OF FENTHION ON THE BLOOD AND TISSUE CHEMISTRY OF A TELEOST FISH (*HETEROPNEUSTES FOSSILIS*). *J. Comp. Pathol.* 93(1):27-31. Jan. 1983. SFA 28(2)
[Dep. Zool., Univ. Gorakhpur, Gorakhpur 273001, U.P., India]

83-001217 Stagg, R. M. and T. J. Shuttleworth. THE EFFECTS OF COPPER ON IONIC REGULATION BY THE GILLS OF THE SEAWATER-ADAPTED FLOUNDER (*PLATICHTHYS FLESUS* L.). *J. Comp. Physiol. B Biochem. Syst. Environ. Physiol.* 149(1):83-90. Nov. 1982. SFA 28(2)
[Dep. Biol. Sci., Univ. Exeter, Hatherly Lab., Prince of Wales Rd., Exeter EX4 4PS, England]

83-001218 Stromberg, P. C.; J. G. Ferrante and S. Carter. PATHOLOGY OF LETHAL AND SUBLETHAL EXPOSURE OF FATHEAD MINNOWS, *PIMEPHALES PROMELAS*, TO CADMIUM: A MODEL FOR AQUATIC TOXICITY ASSESSMENT. *J. Toxicol. Environ. Health* 11(2):247-259. Feb. 1983. SFA 28(2)
[Dep. Vet. Pathol., Tex. A&M Univ., College Station 78843] Seventy-six fathead minnows were exposed to 12 ppm cadmium for 96 h and examined histologically at 1-wk intervals for 30 d. Thirteen fish (17.1%) died during the exposure period. Lesions associated with acute cadmium toxicity were epithelial necrosis of the skin, oral cavity, gills, olfactory organs, kidney, urinary bladder, ureters, gastrointestinal tract, and hemopoietic organ. The lesions were most severe in fish which died. Surviors had similar but less severe and less extensive lesions. Residual minimal to mild multifocal necrosis was observed in gastrointestinal, branchial epithelium and hemopoietic tissue up to 29 d postexposure. Radiotracer studies in 50 fish using ^{115}Cd demonstrated a rapid uptake and two phase elimination of cadmium by the fish. Rapid elimination of cadmium occurred with 1 wk and was correlated with lesions in the urinary epithelium. Slow phase elimination occurred for at least 3 wk and was correlated with persistant minimal necrosis in several tissues.

83-001219 Własow, T. WPŁYW FENOLU NA KREW PSTRĄGA TĘCZOWEGO (*SALMO GAIRDNERI* RICH.) Z UWZGLĘDNIENIEM SEZONOWOŚCI. [THE EFFECT OF PHENOL ON BLOOD OF RAINBOW TROUT (*SALMO GAIRDNERI* RICH.) IN RELATION TO SEASON.] *Zesz. Nauk. Akad. Roln. Tech. Olsz.* 11:67-74. 1980. In Polish with English summ. SFA 28(2)
[Inst. Ichtiobiol., Olsztyn, Poland]

TOXICOLOGY; BIOASSAYS (CONTINUED)

83-001220 Woodhead, A. D. and A. Bornbusch. THE PATTERN OF DISTRIBUTION OF DIMETHYLBENZ(A)ANTHRACENE IN THE AMAZON MOLLY, *POECILIA FORMOSA* (GIRARD), AFTER INTRAPERITONEAL INJECTION. *J. Fish Biol.* 22(2):241-248. Feb. 1983. SFA 28(2)
[Biol. Dep., Brookhaven Natl. Lab., Upton, NY 11973]

RESEARCH AND MANAGEMENT-GENERAL

83-001221 Fitzhugh, L. MAKING PROFESSIONAL DECISIONS. *Cal-Neva Wildl.* 1982:88-91. 1982. SFA 28(2)
[Wildl. Ext., Univ. Calif., Davis 95616] Professionalis should act ethically according to procedures and standards accepted by their peers and the public. Biological decisions should not be affected by personal or employer desires, and clients should be referred to other wildlife professionals when a biologist lacks the necessary specific expertise. These standards are basic to ethical codes in all profesions. The policy-political nature of most wildlife decisions requires non-biological considerations and divides the decision-maker's loyalty between societal and professional aspects of the process. Therefore, it is necessary that professional wildlife biologists follow standard and ethical procedures in the process of decision-making. One such process is outlined. Biological and politcal aspects of decisions should be separated and recognized during the process. Other biologists should recognize political aspects of decisions and refrain from defending political decisions on biological grounds. When biologists consistently make professional-quality decisions, they will be recognized as professionals.

83-001222 Grenfell, W. E., Jr.; H. Salwasser and W. F. Laudenslayer, Jr. THE CALIFORNIA WILDLIFE/FISH HABITAT RELATIONSHIPS SYSTEM. *Cal-Neva Wildl.* 1982:27-33. 1982. SFA 28(2)
[Calif. Dep. Fish Game, 1701 Nimbus Rd., Suite D, Rancho Cordova 95670] The California Wildlife/Fish Habitat Relationships (WFHR) System is an ongoing effort to apply our knowledge of wildlife habitat requirements to identify and explain the consequences of proposed land use activities, particularly those activities that affect vegetation. The U.S. Forest Service initiated the WFHR program in California in 1976 and has developed it for all Forest Service lands in the state. The California Department of Fish and Game is currently expanding the WFHR program to include non-Forest Service lands in California.

83-001223 Hurley, J. F.; H. Salwasser and K. Shimamoto. FISH AND WILDLIFE HABITAT CAPABILITY MODELS AND SPECIAL HABITAT CRITERIA. *Cal-Neva Wildl.* 1982:40-48. 1982. SFA 28(2)
[Stanslaus Natl. For., Sonora, CA]

83-001224 Mason, W. T., Jr. and S. Iker, (eds.). RESEARCH ON FISH AND WILDLIFE HABITAT. *U.S. Environ. Prot. Agency* EPA-600/8-82-022. x + 248p. July 1982. SFA 28(2)
A collection of papers.--RS.

83-001225 Monroe, J. WHY WILDLIFE AND FISHERIES BIOLOGISTS AREN'T TREATED LIKE DOCTORS. *Cal-Neva Wildl.* 1982:83-87. 1982. SFA 28(2)
[703 Poppy Ave., Corona Del Mar, CA 92625]

RESEARCH AND MANAGEMENT-GENERAL (CONTINUED)

83-001226 Monroe, J. WHY WILDLIFE AND FISHERIES BIOLOGISTS AREN'T TREATED LIKE DOCTORS. *Fisheries (Bull. Am. Fish. Soc.)* 8(1):23-25. Jan.-Feb. 1983. SFA 28(2)
[703 Poppy Ave., Corona del Mar, CA 92626]

83-001227 Royce, W. F. TRENDS IN FISHERY SCIENCE. *Fisheries (Bull. Am. Fish. Soc.)* 8(1):10-13. Jan.-Feb. 1983. SFA 28(2)

ADMINISTRATION AND PLANNING

83-001228 Weber, D. T. and D. L. Horak. SURVEY OF INLAND FISHERIES RESEARCH IN STATE GAME AND FISH ORGANIZATIONS. *Fisheries (Bull. Am. Fish. Soc.)* 8(1):14-19. Jan.-Feb. 1983. SFA 28(2)
[Colo. Div. Wildl., 317 W. Prospect, Fort Collins 80526]

REPORTS OF FISHERY STATIONS, STATES, ETC.

83-001229 Roberts, R. J. INSTITUTE OF AQUACULTURE ANNUAL REPORT 1981-82. *Univ. Stirling Inst. Aquacult. Annu. Rep.* 1981-1982: 35p. 1982. SFA 28(2)
[Inst. Aquacult., Univ. Stirling, England]

HABITAT ALTERATIONS

83-001230 FAO of the UN. FISHERY COMMITTEE FOR THE EASTERN CENTRAL ATLANTIC (CECAF). REPORT OF THE SECOND SESSION OF THE WORKING PARTY ON FISHERY STATISTICS. *FAO Fish. Rep.* No. 265. viii + 81p. 1982. SFA 28(2)
[Rome, Italy]

83-001231 Holland, L. E. and J. R. Sylvester. DISTRIBUTION OF LARVAL FISHES RELATED TO POTENTIAL NAVIGATION IMPACTS ON THE UPPER MISSISSIPPI RIVER, POOL 7. *Trans. Am. Fish. Soc.* 112(2B):293-301. Mar. 1983. SFA 28(2)
[U.S. FWS, Box 818, La Crosse, WI 54601]

83-001232 King, R. H.; A. C. Miller and J. E. Glover. PROPOSED RIFFLE CONSTRUCTION IN AN OLD RIVER CHANNEL. *J. Miss. Acad. Sci.* 27:151-161. 1982. SFA 28(2)
[Dep. Biol., Cent. Mich. Univ., Mt. Pleasant]

83-001233 Rogner, J. D. and S. L. Brinton. A POST-IMPOUNDMENT SURVEY OF THE FISHES OF INDIAN CREEK, DEKALB COUNTY, ILLINOIS. *Trans. Ill. State Acad. Sci.* 75(3-4):167-174. 1982. SFA 28(2)
[Dep. Biol. Sci., North. Ill. Univ., DeKalb 60115] A survey of an 18 km segment of the headwaters of Indian Creek was conducted to determine if any changes in fish species composition or distribution had occurred since construction of Lake Shabbona in 1975. Among the species that apparently occurred with some regularity before impoundment, *Carpoides carpio* may no longer be present. *Etheostoma zonale* and *Percina phoxocephala* were

HABITAT ALTERATIONS (CONTINUED)

83-001233 CONTINUED not collected above the lake, and probably were eliminated by the headwater poisoning. *Labidesthes sicculus*, introduced as a forage species in the lake is now established in Indian Creek above and below the lake. Species diversity index values among the collecting stations show a pattern similar to that obtained in a pre-impoundment survey. The continued presence of several species of fish sensitive to reduced water quality is one of several indicators of overall high water quality of Indian Creek.

83-001234 Thatcher, T. L. THE PACIFIC NORTHWEST ELECTRIC POWER PLANNING AND CONSERVATION ACT: FISH AND WILDLIFE PROTECTION OUTSIDE THE COLUMBIA RIVER BASIN. *Environ. Law* 13(2):517-544. 1983. SFA 28(2)

83-001235 Zahary, R. G. and M. J. Hartman. PORTABLE ARTIFICIAL REEFS OF FIXED GEOMETRY. *Prog. Fish-Cult.* 45(1):58-59. Jan. 1983. SFA 28(2)
[Calif. State Univ., Los Angeles 90032]

HARVEST, CREEL CENSUS, ETC.

83-001236 Aro, E. and V. Sjöblom. FISHING EFFORT AND CATCH PER UNIT OF EFFORT OF COD IN FINNISH FISHERIES IN 1976-80. *Int. Counc. Explor. Sea* C.M. 1982/J:24. 16p. 1982. In English with French summ. SFA 28(2)
[Finn. Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

83-001237 Gallaway, B. J. and G. S. Lewbel. THE ECOLOGY OF PETROLEUM PLATFORMS IN THE NORTHWESTERN GULF OF MEXICO: A COMMUNITY PROFILE. *U.S. Fish Wildl. Serv.* FWS/OBS-82/27. xiii + 91p. July 1982. SFA 28(2)
[LGL Ecol. Res. Assoc., Inc., 1410 Cavitt St., Bryan, TX 77801]

83-001238 Guillory, V. and G. Hutton. A SURVEY OF THE LOUISIANA MENHADEN FISHERY BYCATCH. *Proc. La. Acad. Sci.* 45:190. 1982. Abstract only. SFA 28(2)

83-001239 Palm, R. C., Jr. and S. P. Malvestuto. RELATIONSHIPS BETWEEN ECONOMIC BENEFIT AND SPORT-FISHING EFFORT ON WEST POINT RESERVOIR, ALABAMA-GEORGIA. *Trans. Am. Fish. Soc.* 112(1):71-78. Jan. 1983. SFA 28(2)
[Fish. Sect., Off. Prog. Dev., U.S. Peace Corps, Washington, DC 20526]

83-001240 Parmanne, R. and V. Sjöblom. FISHING EFFORT AND CATCH PER UNIT OF EFFORT OF BALTIC HERRING AND SPRAT IN FINNISH FISHERIES IN 1976-80. *Int. Counc. Explor. Sea* C.M. 1982/J:21. 29p. 1982. In English with French summ. SFA 28(2)
[Finn. Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

83-001241 Pollock, B. R. and M. J. Williams. AN ASSESSMENT OF THE ANGLING FISHERY FOR YELLOWFIN BREAM, *ACANTHOPAGRUS AUSTRALIS* (Günther), in Moreton Bay, Australia. *J. Fish Biol.* 22(2):125-132. Feb. 1983. SFA 28(2)
[Fish. Res. Br., Dep. Primary Indus., Transport House, Fortitude Valley, Queensland, Australia]

HARVEST, CREEL CENSUS, ETC. (CONTINUED)

83-001242 Warner, W. S. IMAGE SPECIALIZATION: A STUDY OF STEREOTYPES FOR CROSS-COUNTRY SKIERS AND TROUT FISHERMEN IN MAINE. *Ph.D. dissertation, Univ. Me.* 191p. 1982. From Diss. Abstr. Int. B Sci. Eng. 43(9):2757. Mar. 1983. SFA 28(2)

REGULATIONS

83-001243 Burke, W. T. FISHERIES REGULATIONS UNDER EXTENDED JURISDICTION AND INTERNATIONAL LAW. *FAO Fish. Tech. Pap.* No. 223. v + 123p. 1982. SFA 28(2)
[Univ. Wash., Seattle 98195]

MARKING AND TAGGING

83-001244 Bulak, J. S. EVALUATION OF FLOY ANCHOR TAGS FOR SHORT TERM MARK-RECAPTURE STUDIES WITH BLUEBACK HERRING. *N. Am. J. Fish. Manage.* 3(1):91-94. 1983. SFA 28(2)
[S.C. Wildl. Mar. Resour. Dep., P.O. Drawer 170, Bonneau 29431]

83-001245 Davis, T. L. O. and D. D. Reid. ESTIMATES OF TAG SHEDDING RATES FOR FLOY FT-2 DART AND FD-67 ANCHOR TAGS IN BARRAMUNDI, *LATES CALCARIFER* (BLOCH). *Aust. J. Mar. Freshwater Res.* 33(6):1113-1117. 1982. SFA 28(2)
[Div. Fish. Res., CSIRO Mar. Lab., P.O. Box 21, Cronulla, N.S.W. 2230 Australia]

83-001246 International Council for the Exploration of the Sea. FIN-CLIPPING AND MICROTAGGING OF SALMON IN THE BALTIC SEA. *Int. Counc. Explor. Sea* C.M. 1982/M:42. 2p. 1982. In English with French summ. SFA 28(2)

83-001247 Konagaya, T. A NEW TELEMETRIC METHOD OF DETERMINING THE POSITIONS OF SWIMMING FISH. *Bull. Jpn. Soc. Sci. Fish.* 48(11):1545-1550. Nov. 1982. SFA 28(2)
[Fac. Fish., Mie Univ., Edobashi, Tsu 514, Japan] A new tracking method of biotelemetry is described. The apparatuses used were composed of an acoustic transmitter (pinger), three sonobuoys, wireless receivers and two time-interval counters. The sonobuoys were designed to relay acoustic pulses from the pinger to a base station on land by wireless. The buoys were moored several hundred meters apart so as to form a triangle on the surface of the water. A fish carring the pinger was tracked in the circumscribed circle of the triangle. The wireless signals from the buoys were caught with three receivers at the base station. The successive positions of the fish were calculated from the differences in the received times of the signals. The results of the test showed that this method gives good positional information. It is possible to plot the successive positions of the fish on a *X-Y* plotboard with a computer.

83-001248 Sorensen, P. W.; M. Bianchini and H. E. Winn. INDIVIDUALLY MARKING AMERICAN EELS BY FREEZE BRANDING. *Prog. Fish-Cult.* 45(1):62-63. Jan. 1983. SFA 28(2)
[Grad. Sch. Oceanogr., Univ. R.I., Narragansett 02882-1197]

STOCKING AND INTRODUCTIONS

83-001249 Berry, C. R., Jr. and M. Hudy. SURVIVAL OF STOCKED FINGERLING RAINBOW TROUT OF DIFFERENT LACTATE DEHYDROGENASE PHENOTYPES. *Prog. Fish-Cult.* 45(1):13-16. Jan. 1983. SFA 28(2)
[Utah Coop. Fish. Res. Unit, Utah State Univ., UMC-52, Logan 84322]

83-001250 Ihssen, P. E.; M. J. Powell and M. Miller. SURVIVAL AND GROWTH OF MATCHED PLANTINGS OF LAKE TROUT (SALVELINUS NAMAYCUSH), BROOK TROUT (*SALVELINUS FONTINALIS*), AND LAKE X BROOK F_1 SPLAKE HYBRIDS AND BACKCROSSES IN NORTHEASTERN ONTARIO LAKES. *Ontario Fish. Tech. Rep. Ser.* No. 6. ii + 12p. 1982. SFA 28(2)
[Ontario Minist. Nat. Resour., Fish. Br., Maple] Matched plantings of lake trout (*Salvelinus namaycush*), F_1 splake hybrids and lake trout backcrosses, and brook trout (*Salvelinus fontinalis*), F_1 splake hybrids and brook trout backcrosses were made annually in four small northeastern Ontario lakes for three successive years. The relative performance of the three different crosses in each lake was assessed by gillnetting in the fall, for seven successive years. F_1 hybrids were recovered at rates two to three times greater than the backcrosses, brook trout or lake trout, from all lakes, except one, were only one lake trout to 364 F_1 hybrids was recovered. The number of kg recovered per kg planted ranged from 2.5 to 4.4 for the F_1 hybrids, 0.3 to 1.3 for the backcrosses, and 0.0 to 1.0 for the brook trout and lake trout. The first planting gave the best returns, both in terms of numbers and kilograms recovered; the middle plant, the poorest. The growth rates, recoveries, and condition factors were correlated among crosses, lakes and plantings. The plantings, crosses, or lakes that gave the highest returns also gave the fastest growth rates and the largest condition factors. The F_1 hybrids from the two lakes that gave the fastest growth and highest rates of return matured significantly earlier in life (50% mature at about age 2.5 to 3.0, sexes conbined) than those from the two lakes with the slower growth and lower returns (age 3 to 3.5).

83-001251 Solazzi, M. F.; S. L. Johnson and T. E. Nickelson. THE EFFECTIVENESS OF STOCKING HATCHERY COHO PRESMOLTS TO INCREASE THE REARING DENSITY OF JUVENILE COHO SALMON IN OREGON COASTAL STREAMS. *Oreg. Dep. Fish Wildl. Fish Div. Inf. Rep.* No. 83-1. i + 14p. Jan. 1983. SFA 28(2)
This report summarizes the results of the first 3 years of a 9 year study to determine if total production of adult coho salmon can be increased by stocking hatchery coho salmon presmolts in coastal streams. Stocking significantly increased densities of juvenile coho at the end of the summer rearing period in most streams. However, releases of hatchery presmolts can reduce the density of wild juvenile coho by 40-50%. Variability in results between years and between streams precludes writing criteria to identify streams where hatchery presmolts will provide the most benefits.

FISHING GEAR AND TECHNIQUES

83-001252 Burch, O. NEW DEVICE FOR SAMPLING LARVAL FISH IN SHALLOW WATER. *Prog. Fish-Cult.* 45(1):33-35. Jan. 1983. SFA 28(2)
[Dep. Biol. Sci., Bowling Green State Univ., Bowling Green, OH 43403]

83-001253 Gallagher, R. P. and J. V. Conner. COMPARISON OF TWO ICHTHYOPLANKTON SAMPLING GEARS WITH NOTES ON MICRODISTRIBUTION OF FISH LARVAE IN A LARGE RIVER. *Trans. Am. Fish. Soc.* 112(2B):280-285. Mar. 1983. SFA 28(2)
[Acad. Nat. Sci. Phila., Benedict Estuarine Res. Lab., Benedict, MD 20612]

FISHING GEAR AND TECHNIQUES (CONTINUED)

83-001254 Houser, A. DIVING PLANE FOR A TUCKER MIDWATER TRAWL. *Prog. Fish-Cult.* 45(1):48-50. Jan. 1983. SFA 28(2)
[South Cent. Reservoir Invest., 100 West Rock St., Fayetteville, AR 72701]

83-001255 Koike, A. and S. Takeuchi. [SATURATION OF GILLNET FOR PONDSMELT *HYPOMESUS TRANSPACIFICUS NIPPONENSIS.*] *Bull. Jpn. Soc. Sci. Fish.* 48(12):1711-1716. Dec. 1982. In Japanese with English summ. SFA 28(2)
[Lab. Fish. Technol., Tokyo Univ. Fish., Konan-4, Minato, Tokyo 108, Japan]

83-001256 Main, J. and G. I. Sangster. A STUDY OF A MULTI-LEVEL BOTTOM TRAWL FOR SPECIES SEPARATION USING DIRECT OBSERVATION TECHNIQUES. *Scott. Fish. Res. Rep.* No. 26. 17p. 1982. SFA 28(2)
[Mar. Lab., Aberdeen, Scotland]

83-001257 Nielsen, L. A. VARIATION IN THE CATCHABILITY OF YELLOW PERCH IN AN OTTER TRAWL. *Trans. Am. Fish. Soc.* 112(1):53-59. Jan. 1983. SFA 28(2)
[Dep. Fish. Wildl. Sci., VPI&SU, Blacksburg, VA 24061]

83-001258 Stepanova, N. A. COMPARATIVE EVALUATION OF THE REPELLENT AND ATTRACTIVE EFFECTS OF ELECTRICAL AND ACOUSTIC FIELDS FOR THE BALTIC HERRING, *CLUPEA HARENGUS MEMBRAS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):134-140. 1982. SFA 28(2)
[IEMEZH, Moscow, USSR]

83-001259 Thayer, G. W.; D. R. Colby; M. A. Kjelson and M. P. Weinstein. ESTIMATES OF LARVAL-FISH ABUNDANCE: DIURNAL VARIATION AND INFLUENCES OF SAMPLING GEAR AND TOWING SPEED. *Trans. Am. Fish. Soc.* 112(2B):272-279. Mar 1983. SFA 28(2)
[NMFS, Beaufort Lab., Beaufort, NC 28516]

83-001260 Westrheim, S. J. A NEW METHOD FOR ALLOTTING EFFORT TO INDIVIDUAL SPECIES IN A MIXED-SPECIES TRAWL FISHERY. *Can. J. Fish. Aquatic Sci.* 40(3):352-360. Mar. 1983. In English with French summ. SFA 28(2)
[Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

83-001261 Yamamoto, S.; T. Merguro and K. Shimazaki. [ON THE SELECTIVITY OF THE GILL NET FOR PACIFIC SAURY *COLOLABIS SAIRA* BREVOORT.] *Bull. Fac. Fish. Hokkaido Univ.* 33(4):240-248. Nov. 1982. In Japanese with English summ. SFA 28(2)
[Training Ship "Hokusei Maru" Fac. Fish., Hokkaido Univ., Japan]

FERTILIZATION OF SOIL AND WATER

83-001262 Msiska, O. V. YIELDS OF *SAROTHERODON MOSSAMBICUS* USING INORGANIC FERTILIZERS AND RICE BRAN IN SOUTHERN MALAWI. *Aquaculture* 32(1-2):201-205. Apr. 1983. SFA 28(2)
[Minist. For. Nat. Resour., Fish. Dep., P.O. Box 44, Domasi, Malawi]

FISHWAYS, FISH PASSAGE THROUGH DAMS, ETC.

83-001263 Ewing, R. D.; M. D. Evenson and E. K. Birks. INFRARED FISH COUNTER FOR MEASURING MIGRATION OF JUVENILE SALMONIDS. *Prog. Fish-Cult.* 45(1):53-55. Jan. 1983. SFA 28(2)
[Oreg. Dep. Fish Wildl., Oreg. State Univ., Corvallis 97331]

83-001264 Gloss, S. P. and J. R. Wahl. MORTALITY OF JUVENILE SALMONIDS PASSING THROUGH OSSBERGER CROSSFLOW TURBINES AT SMALL-SCALE HYDROELECTRIC SITES. *Trans. Am. Fish. Soc.* 112(2A):194-200. Mar. 1983. SFA 28(2)
[N.Y. Coop. Fish. Res. Unit, Dep. Nat. Resour., Cornell Univ., Ithaca 14853]

83-001265 Katopodis, C. and N. Rajaratnam. A REVIEW AND LABORATORY STUDY OF THE HYDRAULICS OF DENIL FISHWAYS. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1145. viii + 181p. Jan. 1983. In English with French summ. SFA 28(2)
[Dep. Fish. Oceans, Winnipeg, MB R3T 2N6, Canada]

83-001266 Leslie, J. K. COOLING WATER FLOW VELOCITY IN RELATION TO COLLECTION OF ENTRAINED LARVAL FISH AT POWER PLANTS. *Can. J. Fish. Aquatic Sci.* 40(3):370-373. Mar. 1983. In English with French summ. SFA 28(2)
[Can. Cent. Inland Waters, 867 Lakeshore Rd., Burlington, ON L7R 4A6, Canada]

MATHEMATICS, STATISTICAL METHODS, AND MODELING

83-001267 Garrod, D. J. STOCK AND RECRUITMENT - AGAIN. *Fish. Res. Tech. Rep. Minist. Agric. Fish. Food (Lowestoft)* No. 68. 22p. 1982. SFA 28(2)
[Fish. Lab., Lowestoft, U.K.]

83-001268 Limburg, K. E.; A. Jansson and J. Zucchetto. A COASTAL ECOSYSTEM FISHERIES MINIMODEL FOR THE ISLAND OF GOTLAND, SWEDEN. *Ecol. Model.* 17(3-4):271-295. Dec. 1982. SFA 28(2)
[Dep. Environ. Eng. Sci., Univ. Fla., Gainesville 32611]

83-001269 Tanaka, S. THE MANAGEMENT OF STOCK-FISHERY SYSTEM BY MANIPULATING THE CATCH QUOTA BASED ON THE DIFFERENCE BETWEEN PRESENT AND TARGET STOCK LEVELS. *Bull. Jpn. Soc. Sci. Fish.* 48(12):1725-1729. Dec. 1982. SFA 28(2)
[Ocean Res. Inst., Univ. Tokyo, Minamidai, Nakano, Tokyo 164, Japan]

LAKE MANAGEMENT AND RESEARCH

83-001270 Crowder, L. B. SPECIES INTERACTIONS AND COMMUNITY STRUCTURE OF FISHES IN LAKE MICHIGAN. *Wash. Sea Grant Prog.* WSG-WO 82-2. p. 151-157. Dec. 1982. In: G. M. Cailliet and C. A. Simenstad, eds. Gutshop '81. Fish Food Habits Studies. Wash. Sea Grant, Seattle. Available @ $8.00 from Wash. Sea Grant Commun., 3716 Brooklyn Ave. NE, Seattle, WA 98105. SFA 28(2)

LAKE MANAGEMENT AND RESEARCH (CONTINUED)

83-001271 Finnell, L. M. RESULTS OF FISHERIES INVESTIGATIONS AT TWIN LAKES, COLORADO 1973-76. *U.S. Dep. Interior Bur. Reclam.* REC-ERC-80-5. ii + 47p. Mar. 1983. SFA 28(2)
[Colo. Div. Wildl., 317 W. Prospect, Fort Collins 80526]

83-001272 Hanson, D. A.; B. J. Belonger and D. L. Schoenike. EVALUATION OF A MECHANICAL POPULATION REDUCTION OF BLACK CRAPPIE AND BLACK BULLHEADS IN A SMALL WISCONSIN LAKE. *N. Am. J. Fish. Manage.* 3(1):41-47. 1983. SFA 28(2)
[Wis. Dep. Nat. Resour., Box 309, Spooner 54801]

83-001273 Samples, K. C. and R. C. Bishop. AN ECONOMIC ANALYSIS OF INTEGRATED FISHERIES MANAGEMENT: THE CASE OF THE LAKE MICHIGAN ALEWIFE AND SALMONID FISHERIES. *J. Great Lakes Res.* 8(4):593-602. 1982. SFA 28(2)
[Dep. Agric. Resour. Econ., 210 Bilger Hall, 2545 The Mall, Univ. Hawaii, Honolulu 96822] Intense predator-prey relationships exist between stocks of alewives and salmonids in Lake Michigan. In this paper, the economic implications of these biological interactions are explored and suggestions regarding efficient fisheries management options are made. A theoretical optimal control model is developed which delineates conditions for optimizing alewife and salmonid harvest rates. Model results indicate that the indirect effects which harvesting in one fishery have on harvest costs and returns in the other must be considered if economic efficiency in alewife/salmonid management is to be achieved. Furthermore, marginal net social values associated with alewife and salmonid harvests must be equated. It is estimated that alewives currently have a marginal net social value close to zero compared to $4.10 per salmonid. These finding strongly suggest that utilization of alewife biomass as a forage base for predatory salmonids is more efficient than direct harvesting of alewives in a commercial fishery.

83-001274 Stoffle, R. W.; D. L. Rasch and F. V. Jensen. URBAN SPORT ANGLERS AND LAKE MICHIGAN FISHERY POLICIES. *Coastal Zone Manage. J.* 10(4):407-427. 1983. SFA 28(2)
[Appl. Urban Field Sch., Univ. Wis., Parkside]

RIVER AND STREAM MANAGEMENT AND RESEARCH

83-001275 Haugen, G. N. RIPARIAN BEST MANAGEMENT PRACTICES. *Fisheries (Bull. Am. Fish. Soc.)* 8(1):2,9. Jan.-Feb. 1983. SFA 28(2)

83-001276 Moore, S. E.; B. Ridley and G. L. Larson. STANDING CROPS OF BROOK TROUT CONCURRENT WITH REMOVAL OF RAINBOW TROUT FROM SELECTED STREAMS IN GREAT SMOKY MOUNTAINS NATIONAL PARK. *N. Am. J. Fish. Manage.* 3(1):72-80. 1983. SFA 28(2)
[Fla. Game Fresh Water Fish Comm., St. Johns Fish. Lab., 7630 Coral Dr., West Melbourne 32901

83-001277 Moyle, P. B.; B. Vondracek and G. D. Grossman. RESPONSES OF FISH POPULATIONS IN THE NORTH FORK OF THE FEATHER RIVER, CALIFORNIA, TO TREATMENTS WITH FISH TOXICANTS. *N. Am. J. Fish. Manage.* 3(1):48-60. 1983. SFA 28(2)
[Dep. Wildl. Fish. Biol., Univ. Calif., Davis 95616]

83-001278 Trifonova, O. V. CHANGES IN BREEDING CONDITIONS OF SPRING-SPAWNING FISH IN THE MIDDLE OB DUE TO RIVER FLOW REGULATION. *Sov. J. Ecol. (Engl. Transl. Ékologiya)* 13(4):273-277. Mar. 1983. SFA

RIVER AND STREAM MANAGEMENT AND RESEARCH (CONTINUED)

83-001278 CONTINUED 28(2)
[Siberian Fish. Sci.-Res. Plan. Inst., Novosibirsk, USSR]

83-001279 Wooley, C. M. and E. J. Crateau. OBSERVATIONS OF GULF OF MEXICO STURGEON (*ACIPENSER OXYRHYNCHUS DESOTOI*) IN THE APALACHICOLA RIVER, FLORIDA. *Fla. Sci.* 45(4):244-248. 1982. SFA 28(2)
[U.S. Fish Wildl. Serv., Off. Fish. Assist., 1612 June Ave., Panama City, FL 32405] Twelve Gulf of Mexico Sturgeon (*Acipenser oxyrhynchus desotoi*) were observed from the Apalachicola River, Florida, from 1976-1981. Seven were tagged and released with 2 being recaptured by anglers. Dates and water temperature of upriver, prespawning spring migrations along with downriver, postspawning, fall migration were obtained. One larval sturgeon was captured in the upper Apalachicola River at a temperature of 23.9°C, and a flowing male was observed in the same area at a temperature of 20.6°C. An important sturgeon spawning section of the river has been identified for protection. Angler snagging of sturgeon in the upper Apalachicola River was monitored during 1981, revealing an estimated 35-40 sturgeon (average weight 33-45 kg) harvested. The Gulf of Mexico Sturgeon is currently listed as a threatened species by the Florida Committee on Rate and Endangered Plants and Animals.

LARGE IMPOUNDMENT MANAGEMENT AND RESEARCH

83-001280 Beam, J. H. THE EFFECT OF ANNUAL WATER LEVEL MANAGEMENT ON POPULATION TRENDS OF WHITE CRAPPIE IN ELK CITY RESERVOIR, KANSAS. *N. Am. J. Fish. Manage.* 3(1):34-40. 1983. SFA 28(2)
[Kans. Game Fish Comm., Pratt 67124]

83-001281 Kazanskiy, A. B. MATHEMATICAL MODEL STUDIES OF TSIMLYANSK RESERVOIR FISH COMMUNITY. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 22(3):1-10. 1982. SFA 28(2)
A dynamic continuous-discrete computer model is suggested for the Tsimlyansk Reservoir fish community. The model describes long-term variations in abundance and biomass of fish populations considering food-chain connections and changes in spawning conditions. The populations of seven main commercial species are modeled, including age structure. The remaining species are combined into three trophic groupings and biomass production is described by means of the Schaefer model.

ESTUARY MANAGEMENT AND RESEARCH

83-001282 Bickerton, I. B. ESTUARIES OF THE CAPE. PART II: SYNOPSES OF AVAILABLE INFORMATION ON INDIVIDUAL SYSTEMS. REPORT NO. 11: HARTENBOS (CMS1). *CSIR Res. Rep.* No. 410. 54p. June 1982. SFA 28(2)
[CSIR, Stellenbosch, South Africa]

83-001283 Heinecken, T. J. E. and J. R. Grindley. ESTUARIES OF THE CAPE. PART II: SYNOPSES OF AVAILABLE INFORMATION ON INDIVIDUAL SYSTEMS. REPORT. NO. 10: KOWIE (CSE10). *CSIR Res. Rep.* No. 409. 58p. June 1982. SFA 28(2)
[CSIR, Stellenbosch, South Africa]

83-001284 O'Neil, P. E. and M. F. Mettee. ALABAMA COASTAL REGION ECOLOGICAL CHARACTERIZATION VOLUME 2. A SYNTHESIS OF ENVIRONMENTAL DATA. *U.S. Fish Wildl. Serv.* FWS/OBS-82/42. xvi + 346p. June 1982. SFA 28(2)
[Geol. Surv. Ala., P.O. Drawer O, University 35486]

ESTUARY MANAGEMENT AND RESEARCH (CONTINUED)

83-001285 O'Neil, P. E.; M. F. Mettee; E. J. McCullough; L. A. Acker and D. W. Wilson. ALABAMA COASTAL REGION ECOLOGICAL CHARACTERIZATION VOLUME 1. COASTAL BIBLIOGRAPHY. *U.S. Fish Wildl. Serv.* FWS/OBS-82/21. iv + 404p. June 1982. SFA 28(2)
[Geol. Surv. Ala., P.O. Drawer O, University 35486]

MARINE MANAGEMENT AND RESEARCH

83-001286 Argue, A. W.; R. Hilborn; R. M. Peterman; M. J. Staley and C. J. Walter. STRAIT OF GEORGIA CHINOOK AND COHO FISHERY. *Can. Bull. Fish. Aquatic Sci.* 211. xi + 91p. 1983. In English with French summ. SFA 28(2)
[South Pac. Comm., Noumea, New Caledonia]

83-001287 Crawford, R. J. M. and H. B. Crous. TRENDS IN COMMERCIAL HANDLINE CATCHES OF REDFISHES ALONG THE SOUTHERN CAPE COAST, REPUBLIC OF SOUTH AFRICA. *Koedoe* 25:13-31. 1982. SFA 28(2)
[Dep. Res. Inf., Tsitsichamma Coastal Natl. Park, Storms River 6308, South Africa]

MISC. TECHNIQUES AND EQUIPMENT

83-001288 Dahl, P. H. and O. A. Mathisen. MEASUREMENT OF FISH TARGET STRENGTH AND ASSOCIATED DIRECTIVITY AT HIGH FREQUENCIES. *J. Acoust. Soc Am.* 73(4):1205-1211. Apr. 1983. SFA 28(2)
[Fish. Res. Inst., Univ. Wash., Seattle 98195]

83-001289 Faber, D. J. and S. Gadd. SEVERAL DRAWING TECHNIQUES TO ILLUSTRATE LARVAL FISHES. *Trans. Am. Fish. Soc.* 112(2B):349-353. Mar. 1983 SFA 28(2)
[Natl. Mus. Nat. Sci., Ottawa, ON K1A 0M8, Canada]

83-001290 Litvak, M. K. METHOD FOR MEASURING SMALL FISH. *Prog. Fish-Cult.* 45(1):61. Jan. 1983. SFA 28(2)
[Ramsay Wright Zool. Lab., Dep. Zool., Univ. Toronto, Toronto, ON M5S 1A1 Canada]

83-001291 Majkowski, J. and J. Hampton. THE EFFECT OF PARAMETER UNCERTAINTIES IN AN AGE-LENGTH RELATIONSHIP UPON ESTIMATING THE AGE COMPOSITION OF CATCHES. *Can. J. Fish. Aquatic Sci.* 40(3):272-280. Mar. 1983. In English with French summ. SFA 28(2)
[Div. Fish., CSIRO Mar. Lab., P.O. Box 21, Cronulla, NSW 2230, Australia]

83-001292 Mohr, L. C. EXTERNAL SEX DETERMINATION OF LAKE TROUT (*SALVELINUS NAMAYCUSH*), WHITE SUCKER (*CATOSTOMUS COMMERSONI*) AND LAKE WHITEFISH (*COREGONUS CLUPEAFORMIS*) IN THE EXPERIMENTAL LAKES AREA, NORTHWESTERN ONTARIO. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1114. iv + 14p. Nov. 1982. In English with French summ. SFA 28(2)
[Dep. Fish Oceans, Winnipeg, MB R3T 2N6, Canada] Characteristics of the anal and urogenital openings were used to successfully determine the sex of female and male lake trout (*Salvelinus namaycush*), white sucker (*Catostomus commersoni*) and lake whitefish (*Coregonus clupeaformis*)

MISC. TECHNIQUES AND EQUIPMENT (CONTINUED)

83-001292 CONTINUED from June to October 1981, at the Experimental Lakes Area, northwestern Ontario. Fish were sexed using a) external morphological features, and b) extracting sexual products with a syringe. Dissections were used to confirm external sex determination. The success rate for the procedure was 92% (lake trout), 81% (white sucker), and 92% (lake whitefish). The sexing syringe did not always produce reproductive materials but was used successfully to test elasticity of the urogenital opening and penetrability of the urogenital tract. Distention or retraction of the anal and/or urogenital pores, formation of a genital papilla, coloration and accessibility of the urogenital pore were the most successful characteristics used in externally sexing the fish.

REVIEWS, BIBLIOGRAPHIES, ETC.

83-001293 Dewar, D.; L. Johnson; M. Layton and K. E. Marshall. A BIBLIOGRAPHY OF THE ARCTIC SPECIES OF THE GADIDAE, TO 1982. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1141. iv + 29p. Feb. 1983. In English with French summ. SFA 28(2)
[Dep. Fish. Oceans, Winnipeg, MB R3T 2N6, Canada]

WATER USE AND CONSERVATION

83-001294 Baluyut, E. A. ASSESSMENT OF PROBLEMS IN PLANNING RIVER BASIN DEVELOPMENT INVOLVING A HYDROELECTRIC SCHEME. *FAO Fish. Circ.* No. 753. v + 24p. Dec. 1982. SFA 28(2)
[FAO of the UN, Rome, Italy]

Abe, K.
83-000720
Abo Hegab, S.
83-000653
Acero P., A.
83-001016
Acker, L. A.
83-001285
Adams, P. B.
83-000935
Addison, R. F.
83-000703
Adegboye, J. D.
83-001008
Adler, P. H.
83-000973
Adron, J. W.
83-000614
Agius, C.
83-000654
83-001092
Agrawal, N. K.
83-000655
Aguirre, M.
83-001081
Agulleiro, B.
83-000652
Ajana, A. M.
83-000558
Akiyama, T.
83-000747
Akster, H. A.
83-000696
Alabaster, J. S.
83-001182
Alderman, D. J.
83-001094
Alevizon, W. S.
83-000949
Ali, M. A.
83-000753
Allen, D. M.
83-000817
Allen, J. R. M.
83-000936
Allen, M. J.
83-000871
83-000937
Allen, W. V.
83-000773
Alliot, E.
83-000578
Almaca, C.
83-001047
Almeida Toledo, L. F.
83-000804
Amend, D. F.
83-001105
Anderson, C.
83-000612
83-001185
Andreasen, J. K.
83-001183
Andrews, C.
83-001136
Anekwe, G. E.
83-000685
Angus, R. A.
83-000801
Ans, R. A.
83-000613
Anyanwu, A. O.
83-001128
Aoki, T.
83-001093
83-001102
Aoyama, T.
83-001013
Appelbaum, S.
83-000614
Argue, A. W.
83-001286
Arieli, Y.
83-000594
Arimoto, T.
83-000832
Armstrong, M. L.
83-000938
Arnold, C. R.
83-000831
83-001197
Arnold, D. E.
83-000973
Aro, E.
83-000872
83-000873
83-000874
83-000875
83-001236
Aros, B.
83-000789
Arratia F., G.
83-001048
Arthur, R. H., Jr.
83-001160
Asahina, K.
83-000894
Aspinwall, N.
83-000840
Assem, H.
83-000656
Austin, B.
83-001094
Auvinen, H.
83-000883
83-000923
83-000924
83-000925
Avault, J. W., Jr.
83-000576
Ayling, A. M.
83-001049
Bailey, T. A.
83-001112
83-001113
83-001114

Bailey, T. G.
83-000988
Bailey, W. C.
83-001144
Bain, M. B.
83-001044
Baker, J. A.
83-001176
Balasch, J.
83-001159
Baldwin, J.
83-000780
Ball, S. J.
83-001117
Baluyut, E. A.
83-001294
Banarescu, P. M.
83-001050
Barannikova, I. A.
83-000657
Barba-Torres, F.
83-001025
Barber, W. E.
83-000939
Barco, D. del
83-000615
Barila, T. Y.
83-000818
Barker, C. J.
83-000658
Barlow, G. W.
83-000616
Barnes, A.
83-000570
Bartels, J. E.
83-001152
Barwick, D. H.
83-000997
Bassalert, J. F.
83-001106
Bassleer, R.
83-000622
Bauermeister, A.
83-000659
Bauersfeld, K.
83-001125
Baugh, T. M.
83-000819
83-000895
Baun, K.
83-001154
Baxhall, P. C.
83-000802
Beacham, T. D.
83-000660
Beam, J. H.
83-001280
Bean, R. A.
83-000576
Beck, M. L.
83-000658
Beer, K. E.
83-000569
Behnke, R. J.
83-001017
Belanger, S. E.
83-000998
Bell, G. R.
83-001082
Bell, M. V.
83-000661
Belonger, B. J.
83-001272
Belova, N. V.
83-000662
Ben-Tuvia, A.
83-001026
Benson, D. E.
83-001017
Berdyshev, G. D.
83-000718
Berge, J. A.
83-001155
Bergeron, T.
83-000617
Berland, B.
83-001129
Berry, C. R., Jr.
83-001249
Berry, E. S.
83-001215
Berti, R.
83-000858
Beverley-Burton, M.
83-001150
Bhattacharya, S.
83-000671
Bianchini, M.
83-001248
Bickerton, I. B.
83-001282
Biggers, C. J.
83-000658
Billard, R.
83-000744
Binkowski, F. P.
83-000954
Bird, D. J.
83-000663
Birks, E. K.
83-001263
Birt, T. P.
83-000716
Bishop, R. C.
83-001273
Bjornsson, B. T.
83-000664
Blaber, S. J. M.
83-000850
83-000851
Blanc, J. M.
83-000562
Blankley, W. O.
83-000940
Blaxhall, P. C.
83-000618

Bloom, J. V.
83-001105
Boatman, E. S.
83-001101
Bobak, P.
83-000776
Boehlert, G. W.
83-000999
83-001000
Bohnsack, J. A.
83-000941
Bone, Q.
83-000665
Booth, C. A.
83-001001
Boreman, J.
83-000666
Borg, B.
83-000667
Borisovets, Y. E.
83-000619
Bornbusch, A.
83-001220
Borthwick, P. W.
83-001184
Bosse, M. P.
83-001095
Bourgeois, R.
83-000837
Bourne, P. K.
83-000668
Boush, G. M.
83-001156
83-001157
Bowman, R.
83-000983
Boyd, C. E.
83-000606
Bozeman, E. L.
83-000921
Branstetter, S.
83-001018
Brazo, D. C.
83-000839
Breck, J. E.
83-000820
Brillet, C.
83-000821
Brinton, S. L.
83-001233
Bromley, P. J.
83-000582
Brooke, L. T.
83-001185
Broughton, J. D.
83-001041
Brown, A. V.
83-000938
Brown, J.
83-001100
Brown, J. A.
83-000620
Brown, L. A.
83-001190
Brunetti, V.
83-000807
Bruton, M. N.
83-000994
Buelow, C. R.
83-001181
Bugaev, V. F.
83-001130
Bulak, J. S.
83-001244
Bullock, G. L.
83-001096
Bunya, T.
83-000631
Bur, M. T.
83-000942
Buran, L. E.
83-001149
Burch, O.
83-001252
Burgess, G. H.
83-001057
Burgess, W. E.
83-001051
Burke, W. T.
83-001243
Burns, T.
83-000852
Burr, B. M.
83-001052
83-001053
Burress, R. M.
83-001193
Burton, D. T.
83-001161
83-001194
Burton, V. A.
83-000669
Burzawa-Gerard, E.
83-000694
83-000729
Busack, C. A.
83-000803
Butler, G. S.
83-000943
Buynak, G. L.
83-001058
Cairoli, A. B.
83-001081
Call, D. J.
83-001185
Callahan, J. L.
83-000557
Campana, S. E.
83-001131
Carey, F. G.
83-000670
Carpenter, L. A.
83-001186
Carrier, J. C.
83-000876
Carter, S.
83-001218

Caruso, J. H.
83-001054
Cashner, R. C.
83-000641
83-001053
Cassani, J. R.
83-000944
Castro-Aguirre, J. L.
83-001019
Castro, J. I.
83-001020
Caton, W. E.
83-000944
Cave, W. R.
83-001203
Cech, J. J., Jr.
83-001207
Centro de Investigaciones Pesqueras
83-000853
Chabanny, V. N.
83-000718
Chakraborti, P.
83-000671
Chakroff, M. S.
83-000559
Chapman, J.
83-000945
Charba, J. F.
83-001099
Chavez, H.
83-000854
Chelazzi, L.
83-000858
Chen, Y.
83-001055
Cherry, D. S.
83-000733
Chervinski, J.
83-000672
Chess, J. R.
83-000946
Chesser, R. K.
83-000816
Cheung, P. L.
83-001132
Childers, W. F.
83-000811
Chin, K.
83-000573
Chittenden, M. E., Jr.
83-000933
Choi, K.
83-001021
83-001022
Choubert, G., Jr.
83-000563
Christian, J. J.
83-001204
Christian, P. A.
83-000921
Chu, X.
83-001055
Chubb, A. D.
83-000665
Chupakhin, V. M.
83-000869
Cipriano, R. C.
83-001097
Ciying, Z.
83-001056
Clark, W. H., Jr.
83-000569
Clavijo, I. E.
83-000896
Claytor, R. R.
83-000634
Coburn, M. M.
83-000621
Cochran, M. D.
83-000569
Cochran, P. A.
83-000947
Coetzee, P. W.
83-000903
Cohen, D.
83-000570
Cohen, E. B.
83-000948
Colby, D. R.
83-001259
Coleman, F.
83-000673
Colgan, P. W.
83-000900
Colton, D. E.
83-000949
Cone, D. K.
83-001133
Conner, J. V.
83-001058
83-001253
Conroy, D. A.
83-001081
Contreras, M.
83-000878
Cooper, C. M.
83-001158
Corbett, B.
83-000855
Cordier-Perroy, L.
83-000674
Cossins, A. R.
83-000668
Courtney, W. A. M.
83-000708
Cowen, R. K.
83-000950
Crateau, E. J.
83-001279
Crawford, R. J. M.
83-001287
Crespo, S.
83-001187
Cross, J. N.
83-000951
Crous, H. B.
83-001287

Crow, M. E.
83-000952
83-000953
Crowder, L. B.
83-000954
83-001270
Cryer, M.
83-000995
Currence, L. E.
83-000934
Cyrus, D. P.
83-000851
D'Allessandris, R.
83-001196
D'yakonov, Y. N.
83-000675
Dabrowski, K.
83-000676
Dahl, G. J.
83-001038
Dahl, P. H.
83-001288
Daniels, R. A.
83-000979
Dannevig, B. H.
83-000677
Davidoff, E. B.
83-000877
Davie, P. S.
83-000678
83-000680
83-000745
83-000758
Davis, K. B.
83-000636
83-000679
83-000829
Davis, T. L. O.
83-001245
Dawidowicz, P.
83-000955
Dawson, S. M.
83-000706
Daxboeck, C.
83-000678
83-000758
Daxboeck, D.
83-000680
De Silva, S. S.
83-000591
De Sylva, D. P.
83-001027
Dear, G.
83-001098
83-001109
Decken, A. von der
83-000769
Deehr, R.
83-000980
83-001023
Degani, G.
83-000583
DeLaney, R. G.
83-000681
Delerue-Le Belle, N.
83-000683
Delfino, J. J.
83-001181
DeMartini, E.
83-000987
DeMartini, E. E.
83-000856
DeMont, D. J.
83-000897
DeNeff, S. J.
83-000898
Dentler, J. L.
83-001115
Denuce, J. M.
83-000642
Deschaux, P.
83-000674
DeVore, P. W.
83-001134
DeVries, A. L.
83-000772
Dewar, D.
83-001293
Dheer, T. R.
83-000738
Diana, J. S.
83-000857
Dilego, R. A.
83-001191
Dill, L. M.
83-000957
Dimmick, W. W.
83-001052
Divanach, P.
83-000571
83-000601
Dodson, J.
83-001037
Dodson, J. J.
83-000880
Doi, T.
83-000878
Donaldson, E. M.
83-000607
83-000785
Donohue, K.
83-001024
Doroshov, S. I.
83-000569
Dosoretz, C.
83-000583
Driedzic, W. R.
83-000682
Dudgeon, D.
83-000956
Duewer, D. L.
83-001070
Dufour, S.
83-000683
Dunbrack, R. L.
83-000957
Duncan, D. A.
83-001188

Dunford, W. E.
83-000882
Dunham, R. A.
83-000684
Duvall, D.
83-000692
Dye, H. M.
83-000785
Dykova, I.
83-001118
Eaton, D. L.
83-001186
Eaton, J. G.
83-001134
Eaton, W.
83-001135
Ebeling, A. W.
83-000958
83-000970
83-000971
Eddy, F. B.
83-000779
Edsall, P.
83-001024
Edwards, R. J.
83-001040
Eggers, D. M.
83-000879
83-000959
83-000990
Ellgaard, E. G.
83-000746
Ellis, A. E.
83-001098
Emery, A. R.
83-001075
Emmersen, J.
83-000726
Emokpae, A. O.
83-000685
Engel, C.
83-000987
English, K. K.
83-000960
Epple, A.
83-000686
Erckens, W.
83-000822
83-000823
Ercolini, A.
83-000858
Evans, D. H.
83-000687
83-000749
Evenson, M. D.
83-001263
Evertse, P. A. C. M.
83-000642
Ewing, R. D.
83-001263
Eyeson, K. N.
83-000572
Faber, D. J.
83-001289
Facey, D. E.
83-000928
Fadeeva, T. A.
83-000657
Failla, M. L.
83-000733
FAO of the UN
83-001230
Feathers, M. G.
83-000688
83-000723
Feller, G.
83-000622
Feller, R.
83-000689
Fensch, G. E.
83-001099
Ferguson, M. M.
83-000824
Ferguson, M. S.
83-001086
Ferrante, J. G.
83-001218
Fiedler, D. R
83-001177
Fine, M. L.
83-000825
Fingerman, S. W.
83-001189
83-001190
Finnell, L. M.
83-001271
Firling, C. E.
83-000792
Fish, P. A.
83-000826
Fisher, J. W.
83-001191
83-001196
Fishman, A. P.
83-000681
FitzGerald, G. J.
83-000899
Fitzhugh, L.
83-001221
Fletcher, T. C.
83-000795
Flick, W. A.
83-001123
Flores-Coto, C.
83-001025
Flos, R.
83-001159
Fontaine, Y.
83-000683
Foresti, F.
83-000804
Forney, J. C.
83-001178
Forney, J. L.
83-000978
Forster, M. E.
83-000745

Fouche, L.
83-000573
Franz, R.
83-001057
Frechet, A.
83-000880
Frere, P. E.
83-000934
Fricke, H. W.
83-000827
Fryer, G.
83-001136
Fryer, J. L.
83-001127
Fugelli, K.
83-001192
Fugii, T.
83-000982
Fuiman, L. A.
83-001058
Fujio, Y.
83-000808
Fujita, S.
83-000595
Fukayama, S.
83-000690
Fukudome, M.
83-001102
Fulton, J.
83-000901
Fursa, T. I.
83-000623
Furuichi, M.
83-000586
Gabrion, C.
83-001151
Gadd, S.
83-001289
Gaigher, I. G.
83-000574
Galante, R.
83-000681
Galeano, M. L.
83-001137
Gall, G. A. E.
83-000803
Gallagher, R. P.
83-001253
Gallaway, B. J.
83-001237
Garman, G. C.
83-000828
Garrod, D. J.
83-001267
Gaskin, D. E.
83-000905
Geevarghese, C.
83-001059
Geiger, D. L.
83-001191
George-Nascimento, M.
83-001090
George, S. G.
83-000614
Gerking, S. D.
83-000691
83-001202
Gerlach, J. M.
83-001060
Gern, W. A.
83-000669
83-000692
83-000790
Ghani, N.
83-001168
Ghittino, P.
83-000560
Gibson, Q. H.
83-000670
Gibson, R. N.
83-000881
Gielen, J. T.
83-000693
Gilbert, J. P.
83-001100
Gilderhus, P. A.
83-001193
Gill, H. S.
83-000793
Ginal, J.
83-001144
Gingras, L. G.
83-000715
Giraud, A. S.
83-000624
Gitter, M. J.
83-000820
Gliwicz, Z. M.
83-000955
Gloss, S. P.
83-001264
Glover, J. E.
83-001232
Goessens, G.
83-000622
Golani, D.
83-000859
83-001026
Goldschmid, A.
83-000961
Goldstein, R. M.
83-001180
Goncharov, B. F.
83-000694
83-000729
Gorbman, A.
83-000748
83-000763
Gordon, D.
83-001200
Goren, M.
83-001050
83-001061
83-001062
Gores, K. X.
83-000568
Gossett, R. W.
83-001160

Gots, B. L.
83-000634
83-001171
Goudie, C. A.
83-000829
Gould, R. W.
83-001101
Graham, J. B.
83-000695
Graham, M. S.
83-000799
Grall, C.
83-001027
Grant, J. W. A.
83-000900
Granzier, H. L. M.
83-000696
Gratzek, J. B.
83-001100
Graves, W. C.
83-001161
83-001194
Gray, C. J.
83-000620
Gray, R. H.
83-000697
Greeley, M. S., Jr.
83-000580
Green, J. E.
83-001141
Greenfield, D. W.
83-000962
83-001066
Greenfield, T. A.
83-000962
Gregory, W. A.
83-000698
Grenfell, W. E., Jr.
83-001222
Greuel, E.
83-000588
Grindley, J. R.
83-001283
Grizzle, J. M.
83-001138
Grobecker, D. B.
83-000963
Grosslein, M. D.
83-000948
Grossman, G. D.
83-000964
83-001277
Gruber, K.
83-000699
Grupcheva, G.
83-001118
Guest, W. C.
83-001119
Guillory, V.
83-001028
83-001238
Gulidov, M. V.
83-000700
Gulliksen, B.
83-000860
Gulvas, J.
83-000839
Haga, Y.
83-000602
Hahnel, G. B.
83-001101
Hails, A. J.
83-000701
Haley, B. E.
83-000790
Hall, J. G.
83-001077
Hall, L. W., Jr.
83-001161
83-001194
Halpern-Sebold, L. R.
83-000702
Hamada, K.
83-001029
Hamoir, G.
83-000622
Hampl, A.
83-000625
Hampton, J.
83-001291
Hanke, W.
83-000653
83-000656
Hansen, P.
83-000703
Hanson, D. A.
83-001272
Hansson, T.
83-000664
83-000704
Hanyu, I.
83-000894
83-000915
Haraldstad, O.
83-000830
Hardy, G. S.
83-001030
Hardy, R. W.
83-000584
Hartig, J. H.
83-001178
Hartley, S. E.
83-000805
Hartman, M. J.
83-001235
Hasegawa, S.
83-000720
Hashimoto, K.
83-000814
Hashimoto, M.
83-001087
Hassur, H.
83-001135
Haug, T.
83-000860
Haugen, G. N.
83-001275

Havelka, M.
83-001001
Hawkins, W. E.
83-001120
83-001121
83-001195
Hay, D. E.
83-000901
83-000911
Haymes, G. T.
83-000882
Hazel, J. R.
83-000705
Hecht, T.
83-001063
Hedrick, R. P.
83-001127
Heinecken, T. J. E.
83-001283
Heisinger, J. F.
83-000706
Helfman, G. S.
83-000921
Helfrich, L. A.
83-001044
Helland, J. M.
83-000842
Henderson, V.
83-001196
Hendricks, J.
83-001135
Hendrickson, D. A.
83-001046
Hepner, D. J.
83-000934
Herbold, B.
83-000979
Hernandez, F.
83-000652
Herring, J.
83-001158
Herring, P. J.
83-000707
Hettler, W. F.
83-000579
Hibiya, T.
83-000626
Hickel, R.
83-000575
Hilborn, R.
83-001286
Hirano, T.
83-000720
83-000778
Hirasawa, Y.
83-000747
Hirji, K. N.
83-000627
83-000708
Hixon, M. A.
83-000965
Hocutt, C. H.
83-000818
Hoenig, J. M.
83-001139
Hoeppel, R. E.
83-001162
Hogler, S. R.
83-000998
Holland, L. E.
83-001231
Hollerman, W.
83-001064
Holmgren, S.
83-000709
Holt, G. J.
83-001197
Holt, S. A.
83-000831
Holtz, W.
83-000566
83-000567
Hong, S. Y.
83-001033
Horak, D. L.
83-001228
Horman, S. R.
83-001080
Horne, M. T.
83-000805
83-001092
Horoszewicz, L.
83-000902
Hossler, F. E.
83-000628
Houde, E. D.
83-001027
Houser, A.
83-001254
Howell, B. R.
83-000582
Hoyer, M. V.
83-000611
Hu, F.
83-000732
Hubert, W. A.
83-000922
Hubschman, J. H.
83-001140
Hudd, R.
83-000875
Hudy, M.
83-001249
Humbert, W.
83-000638
Huner, J. V.
83-000576
Hunter, G. A.
83-000785
Hurley, J. F.
83-001223
Hurley, S. T.
83-000922
Hutton, G.
83-001238
Huyer, A.
83-000608

Huysseune, A.
83-000629
83-000630
Hyder, M.
83-000722
Hyvarinen, H.
83-000605
Ichii, T.
83-000710
Ichinohe, K.
83-000724
Idler, D. R.
83-000796
Iemura, N.
83-001093
Iga, T.
83-000711
Ihssen, P. E.
83-001250
Iker, S.
83-001224
Ikonen, E.
83-000883
83-000923
83-000924
83-000925
83-000989
Ince, B. W.
83-000712
Innes, D. J.
83-001077
Inoue, M.
83-000832
Insalaco, S. E.
83-001163
International Council for the Exploration of the Sea
83-001246
Irvine, G. V.
83-000966
Isbrucker, I. J. H.
83-001065
Ishimatsu, A.
83-000713
83-000714
Ismail, M. H.
83-000630
Itatsu, N.
83-000724
Itazawa, Y.
83-000713
83-000714
Ito, Y.
83-000725
Itzkowitz, N.
83-001164
Ivanova, M. N.
83-000992
Izyumov, Y. G.
83-000835
Jackson, P. B. N.
83-000903
Jakobsen, T.
83-000926
Jansson, A.
83-001268
Jenes, C. K.
83-001126
Jenkins, R. L.
83-000833
Jensen, F. V.
83-001274
Jensen, G. L.
83-000806
Jeon, S.
83-001021
Jeon, S. R.
83-001165
Jezierska, B.
83-001202
Jirasek, J.
83-000625
Jobling, M.
83-001002
Joern, W. T.
83-000715
Johannessen, K. I.
83-001155
John, P. A.
83-001059
Johnson, A. G.
83-001003
Johnson, K. A.
83-001105
Johnson, L.
83-001293
Johnson, R. E.
83-001166
Johnson, R. K.
83-001066
Johnson, S. L.
83-001251
Johnson, W. J.
83-000904
Johnston, C. E.
83-000716
Johnston, J.
83-000779
Jones, J. C.
83-000815
Jones, J. J.
83-000727
Jones, J. R.
83-000611
Jones, K. A.
83-000834
Jonsson, B.
83-000830
Jouanneteau, J.
83-000768
Jovellanos, C. L.
83-000905
Jude, D. J.
83-000839
Jutila, E.
83-000892
Kadura, S. N.
83-000718

Kaeriyama, M.
83-000631
Kakuda, S.
83-001068
Kalinich, R. A.
83-000775
Kallemeyn, L.
83-000861
Kallman, K. D.
83-000807
Kapuscinski, A. R. D.
83-000564
Karn, C. M.
83-000692
Karnaky, K. J., Jr.
83-001187
Karplus, I.
83-001062
Kastner, R.
83-000717
Kasyanov, A. N.
83-000835
Katae, H.
83-001087
Katayama, T.
83-000597
Katopodis, C.
83-001265
Kawai, K.
83-001103
Kawamura, G.
83-000836
Kawamura, T.
83-000719
83-001108
Kawano, K.
83-001102
Kawauchi, H.
83-000720
Kazanskiy, A. B.
83-001281
Kearn, G. C.
83-001141
Kelly, K. F.
83-000661
Kelly, W. R.
83-001143
Kenaga, E. E.
83-001198
Kennedy, N.
83-000573
Kent, R. J.
83-001185
Kentouri, M.
83-000571
83-000601
Kerby, J. H.
83-000603
Kesbeke, F.
83-000787
Khrapunov, S. N.
83-000718
Kieser, R.
83-001070
Kihara, K.
83-000927
83-001032
Kijima, A.
83-000808
Killcreas, W.
83-000573
Killcreas, W. E.
83-000575
Kim, I. S.
83-001165
Kim, Y. U.
83-001033
Kimata, M.
83-000721
Kime, D. E.
83-000722
Kimmel, C. B.
83-000764
Kimura, I.
83-001142
King, R. H.
83-001232
Kinghorn, B.
83-000809
Kinghorn, B. P.
83-000561
Kinzer, H. G.
83-001091
Kiorboe, T.
83-001167
Kirchgessner, M.
83-000589
Kirillov, A. F.
83-000967
Kiriyama, T.
83-001142
Kirsch, R.
83-000638
Kitajima, C.
83-000595
Kitao, T.
83-001093
83-001102
Kitaori, H.
83-001142
Kitting, C. L.
83-000831
Kjelson, M. A.
83-001259
Kjorsvik, E.
83-001199
Klaverkamp, J. F.
83-001188
Klocek, R.
83-001200
Knable, A. E.
83-000688
83-000723
Knight, L. A., Jr.
83-001158
Knights, B.
83-001201

Knuth, M. L.
83-001185
Kobayashi, H.
83-000724
Kochkin, P. N.
83-001004
Koehn, R. K.
83-001077
Koike, A.
83-001255
Koizumi, C.
83-000750
Konagaya, T.
83-001247
Konikoff, M.
83-000715
Korean Association for Conservation of Nature, Inc.
83-001034
Korenaga, S.
83-000725
Korf, H.-W.
83-000788
Kormanik, G. A.
83-000687
Korsgaard, B.
83-000726
83-000759
Kostecki, P. T.
83-000727
Koster, F.
83-001031
Kou, K.
83-000725
Kouno, K.
83-001087
Kraiem, M. M.
83-001005
Kramer, D. L.
83-000728
83-000837
Krause, J. B.
83-000574
Krichgessner, M.
83-000598
Krise, W. F.
83-000577
Kruse, G. H.
83-000608
83-000906
Kuhns, J. F.
83-001083
83-001084
83-001085
Kusuda, R.
83-001103
Kuznetzov, A. A.
83-000694
83-000729
Kwain, W.
83-000862
Kyle, J. H.
83-001168
Kyushin, K.
83-000891
La Bolle, L. D., Jr.
83-000968
LaBar, G. W.
83-000928
Lacy, E. R.
83-000730
Lamarche, A.
83-000610
Lammers, P. I.
83-000794
Lamon, M. S.
83-000907
Langton, R.
83-000983
Lannan, J. E.
83-000564
Lapi, L.
83-001070
Larimore, R. W.
83-001169
Larson, G. L.
83-001276
Lasiak, T. A.
83-000884
Last, P. R.
83-000969
Lathrop, B. F.
83-001058
Laudenslayer, W. F., Jr.
83-001222
Lauder, G. V.
83-000632
83-000731
83-001067
Laur, D. R.
83-000958
83-000970
83-000971
Laurent, P.
83-000681
Layiwola, P. J.
83-001201
Layton, M.
83-001293
Le Gac, P.
83-001104
Lean, D. R. S.
83-000609
Lee, C.
83-000732
Lee, R. M.
83-000691
83-001202
Lemly, A. D.
83-001170
Lenanton, R. C. J.
83-000838
83-000985
Leonard, R. B.
83-000767
Lesel, R.
83-001104

Leslie, J. K.
83-001266
Lester, R. J. G.
83-001143
Levanon, D.
83-000583
Levy, D. A.
83-000972
Lewbel, G. S.
83-001237
Lewendon, A.
83-000659
Lewis, A. G.
83-001203
Ley, H. L. III
83-000733
Li, W.
83-000643
Lied, E.
83-000769
Liem, K. F.
83-001067
Light, R. W.
83-000973
Limburg, K. E.
83-001268
Limsuwan, C.
83-001211
Lin, H.
83-000785
Lindquist, D. G.
83-000870
Linnecar, D. F. C.
83-001201
Lintlop, S. P.
83-000734
83-000735
Litvak, M. K.
83-001290
Liu, E. H.
83-000815
Livingston, J. M.
83-001191
83-001196
Livingston, R. J.
83-001205
Loekle, D. M.
83-001204
Loew, E. R.
83-000841
Lohr, A. L.
83-001100
Lom, J.
83-001118
Loneragan, N. R.
83-000985
Lonning, S.
83-001199
Loos, J. J.
83-001058
Lowe-Jinde, L.
83-000736
Lowe, D. A.
83-000770
Lowik, C. W. G. M.
83-000786
Luer, C. A.
83-000863
Lund, B.
83-000769
Luquet, P.
83-000563
Lutes, P. B.
83-000569
Lynn, M.
83-001190
Lythgoe, J. N.
83-000633
MacCrimmon, H. R.
83-000634
83-001171
MacDonald, D. J.
83-000737
Macdonald, J. S.
83-000974
MacFarlane, R. B.
83-001205
MacGregor R. III
83-000580
Mackenzie, B. J.
83-001172
Mackie, A. M.
83-000614
Mackie, G. L.
83-001086
Maestrone, G.
83-001096
Mahajan, C. L.
83-000655
83-000738
Main, J.
83-001256
Majkowski, J.
83-001291
Makarewicz, J. C.
83-001163
Mallery, C. H.
83-000739
Mallett, M. J.
83-001182
Malvestuto, S. P.
83-001239
Manley, D.
83-000837
Mansberger, L.
83-000687
Mansfield, P. J.
83-000839
Manzano e Silva, M. J.
83-000789
Maran, B.
83-001148
Marchaim, U.
83-000583
Margrey, S. L.
83-001194
Margrey, S. T.
83-001161

Marley, R. D.
83-001035
Marquez-Espinoza, A.
83-001019
Marraro, C. H.
83-000908
Marrin, D. L.
83-000975
Marshall, K. E.
83-001293
Marshall, S. L.
83-000865
Martin, W.
83-000822
83-000823
Masai, H.
83-000635
Mason, W. T., Jr.
83-001224
Massoud, A. A.
83-000636
Masuda, K.
83-000931
83-000982
Mathisen, O. A.
83-001288
Mathur, S. N.
83-001116
Matsuura, S.
83-000740
83-001014
Matsuyama, M.
83-000740
Matthews, A. D.
83-001173
Matty, A. J.
83-000593
Maule, A. G.
83-000976
Mayberry, L. F.
83-001091
Maynard, S. D.
83-000864
McAda, C. W.
83-000909
83-001045
McAllister, P. E.
83-001124
McBride, D. N.
83-000865
McCarthy, D. H.
83-001105
McClearn, D.
83-000977
McCormick, F. H.
83-000840
McCullough, E. J.
83-001285
McDonald, D. G.
83-000741
83-000742
McEachran, J. D.
83-001018
McElman, J. F.
83-000637
McFarland, W. N.
83-000841
McGuire, A. B.
83-000569
McKay, L. R.
83-001006
McKaye, K. R.
83-000910
McKeown, B. A.
83-000737
McNamara, J. N.
83-001163
McPhail, J. D.
83-000911
Meacham, C. P.
83-000879
Meade, J. W.
83-000577
Meffe, G. K.
83-001046
Meister, M. F.
83-000638
Mellinger, J.
83-000743
Mendizabal, D.
83-000878
Menezo, Y.
83-000744
Merchant, L. H.
83-000628
Meredith, A. S.
83-000745
Merguro, T.
83-001261
Merrick, J. R.
83-001007
Messana, G.
83-000858
Metcalfe, J. L.
83-001210
Metcalfe, W. K.
83-000764
Mettee, M. F.
83-001284
83-001285
Metzinger, S. E.
83-000746
Meyler, B. L.
83-000613
Michaud, D. T.
83-000839
Michel, C.
83-001106
Middaugh, D. P.
83-000912
Midgley, S. H.
83-001007
Miller, A. C.
83-001232
Miller, M.
83-001250

Miller, R. R.
83-001074
Millett, K. M.
83-000604
Millikin, M. R.
83-000585
Mills, E. L.
83-000978
Miltner, M.
83-000576
Minami, T.
83-000866
Minckley, W. L.
83-000939
83-001046
Mishra, J.
83-001206
83-001216
Mitchell, C. P.
83-000913
Mitchell, L. G.
83-001144
Mitchell, S. J.
83-001207
Mitoma, Y.
83-001093
Mizuno, Y.
83-001102
Mochaba, F. M.
83-001109
Mochioka, N.
83-001068
Mohlenberg, F.
83-001167
Mohr, L. C.
83-001292
Mokady, S.
83-000594
Moles, A.
83-001145
83-001208
Moller, P.
83-000848
Monroe, J.
83-001225
83-001226
Moody, R. C.
83-000842
Moore, P. R.
83-000997
Moore, S. E.
83-001276
Moore, T. O.
83-000856
Morgan, R. P. II
83-001174
Moriarity, C.
83-001185
Morikawa, S.
83-001142
Morita, K.
83-000586
Mork, J.
83-001069
Morton, W. B.
83-001086
Moyle, P. B.
83-000979
83-001277
Mrowka, W.
83-001209
Msiska, O. V.
83-001262
Mugiya, Y.
83-000710
Mugridge, R. E. R.
83-001146
Mulcahy, D.
83-001125
83-001126
Mulligan, T. J.
83-001070
Mumaw, L.
83-000599
Munger, G. J.
83-001147
Munz, F. W.
83-000817
Murachi, S.
83-000783
Murai, T.
83-000747
Murphy, J. L.
83-000716
Naito, N.
83-000720
Nakai, Y.
83-000720
Nakamura, S.
83-001087
Nalbant, T. T.
83-001050
Neas, N. P.
83-000705
Nelson, G.
83-001071
Nelson, J. S.
83-001072
Neves, R. J.
83-000885
Nibbio, B.
83-000686
Nickelson, T. E.
83-001251
Nielsen, L. A.
83-001257
Nieuwenhuys, R.
83-000639
Nigrelli, R. F.
83-001132
Niimi, A. J.
83-000736
83-001175
Nijssen, H.
83-001065
Nimmo, I. A.
83-000659

Ning, W. G.
83-000832
Nishiyama, T.
83-000982
Noakes, D. L. G.
83-000824
Noe, L. A.
83-001174
Nomura, S.
83-001107
Nomura, T.
83-001093
Northcutt, R. G.
83-000844
Norum, K. R.
83-000677
Nose, T.
83-000747
Nottage, A. S.
83-000867
Nozaki, M.
83-000748
Nurnberger, F.
83-000788
Nursall, J. R.
83-000908
O'Gorman, R.
83-001036
O'Neil, P. E.
83-001284
83-001285
Obradovic, J.
83-001148
Ochman, S.
83-001037
Oduleye, S. O.
83-000749
Oelschlager, H. A.
83-000640
Oey, P. L.
83-000639
Ohshima, T.
83-000750
Ohta, M.
83-000595
Oida, T.
83-001087
Oikari, A.
83-000687
Ojima, Y.
83-000635
Okamoto, N.
83-001127
Okazaki, T.
83-000810
Oksche, A.
83-000788
Olayemi, J. Y.
83-001008
Oliva, M.
83-001149
Olivereau, J.
83-000751

...CONTINUED...
Olivereau, J.
83-000752
Olivereau, M.
83-000751
83-000752
Olney, J. E.
83-000929
Olsson, R.
83-000788
Olvera Limas, R. M.
83-000886
Omura, Y.
83-000753
Oni, S. K.
83-001008
Onohara, T.
83-001014
Onuf, C.
83-000945
Ort, T.
83-000577
Osborne, J. A.
83-000557
83-001099
Osse, J. W. M.
83-000696
Ott, J. F.
83-000754
Overstreet, R. M.
83-001120
83-001121
83-001195
Owen, B.
83-000980
83-001023
Ozawa, M.
83-000724
Pack, A. I.
83-000681
Padilla Garcia, M. A.
83-000887
Page, L. M.
83-000914
Page, T. L.
83-000697
Palm, R. C., Jr.
83-001239
Pals, N.
83-000755
83-000843
Palsson, J.
83-001150
Panattieri, A.
83-000615
Pandian, T. J.
83-000756
Paperna, I.
83-001122
Pardue, G. B.
83-000885
Paris, J.
83-000601
Parker, N. C.
83-000679

Parmanne, R.
83-000888
83-000889
83-000930
83-001240
Parsons, G. R.
83-001009
Paschal, R.
83-000573
Pascho, R. J.
83-001126
Pasteur, N.
83-001151
Pastoureaud, A.
83-000578
Paszkowski, C. A.
83-000981
Pathak, S.
83-000804
Patrick, J. M., Jr.
83-001184
Pavela, J. S.
83-000933
Paxton, J. R.
83-001049
Paxton, R.
83-000757
Pearcy, W. G.
83-000982
Peirson, G.
83-000995
Penlington, B. P.
83-000913
Pennington, C. H.
83-001038
83-001176
Pennington, M.
83-000983
Penrith, M. J.
83-001039
Pepys, M. B.
83-000795
Perach, Z.
83-000583
Percy, W. G.
83-000931
Peres, G.
83-000674
83-000768
Perkins, E. J.
83-000867
Perry, S. F.
83-000678
83-000680
83-000758
Perry, W. G.
83-000890
Persson, L.
83-000984
Peterman, R. M.
83-001286
Peters, R. C.
83-000755
Petersen, I.
83-000726
Petersen, I. M.
83-000759
Peterson, D. C.
83-000781
Peterson, R. H.
83-001210
Petrere, M., Jr.
83-001010
Pettersson, K.
83-000760
Petursson, P. M.
83-001011
Pezold, F. L.
83-000641
83-001040
Pfeffer, E.
83-000588
Philipp, D. P.
83-000811
Pickering, A. D.
83-000761
Piironen, J.
83-000605
Pinchuk, V. I.
83-001073
Piomelli, D.
83-000762
Pirie, B. J. S.
83-000614
Planas, D.
83-000610
Plisetskaya, E.
83-000763
Plouidy, M.
83-000744
Plumb, J. A.
83-001211
Plummer, K.
83-000987
Plummer, K. M.
83-000856
Poisson, H.
83-000562
Pollock, B. R.
83-001241
Popova, K. S.
83-000700
Popper, A. N.
83-000844
Poss, S. G.
83-001074
Post, G.
83-001095
Poston, H. A.
83-000565
Potter, I. C.
83-000663
83-000985
Potter, M. E.
83-001176
Pottinger, T. G.
83-000761

Powell, J. H.
83-001177
Powell, M. J.
83-001250
Power, J. H.
83-000932
Powles, H.
83-000880
Powles, P. M.
83-000855
Prabhuji, S. K.
83-001116
Prentice, E. F.
83-000568
Prepejchal, W.
83-001180
Prince, J. D.
83-000985
Protopopov, N. K.
83-001012
Provancha, M. J.
83-001195
Prugh, J. I. P.
83-000764
Puffer, H. W.
83-001160
Purcell, L. J.
83-000845
Putnam, M. E.
83-001191
Quammen, M.
83-000945
Ra'Anan, Z.
83-000570
Rafter, J.
83-000704
Rahel, F. J.
83-000765
Rajaratnam, N.
83-001265
Rakocinski, C. F.
83-000962
Rakshit, D. K.
83-000671
Ram, R. N.
83-001212
Ramage, P. I. N.
83-000659
Ramsey, J. S.
83-000993
Randall, D. J.
83-000678
83-000680
83-000758
Randall, J. E.
83-001075
Rasch, D. L.
83-001274
Rasin, V. J., Jr.
83-001174
Ray, S.
83-001210
Rayment, J.
83-001094
Reid, D. D.
83-001245
Reiersen, L.
83-001155
Reinking, L. N.
83-000766
Reist, J. D.
83-000986
Renaud, F.
83-001151
Retzer, M. E.
83-000914
Rhodes, D.
83-000774
Rice, J. A.
83-000947
Rice, S. D.
83-001208
Richardson, B. J.
83-000812
83-000813
Riddell, D. J.
83-000868
Ridley, B.
83-001276
Riisgard, H. U.
83-001167
Rimmer, M. A.
83-001007
Rinne, J. N.
83-001046
Ritchie, T. C.
83-000767
Riva, M. C.
83-001159
Rizvi, S. J. H.
83-001116
Roberts, D.
83-000987
Roberts, R. J.
83-001229
Robins, J.
83-001024
Robinson, H.
83-001135
Robison, B. H.
83-000988
Roche, H.
83-000768
Rogner, J. D.
83-001233
Rohrer, T. K.
83-001178
Roley, D. D.
83-000568
Romani, D.
83-000824
Romero, M.
83-001137
Rosenberg, R.
83-001011
Rosenlund, G.
83-000769

Ross, J. L.
83-000933
Rowland, W. J.
83-000846
Royce, W. F.
83-001227
Rudnev, V. A.
83-000869
Ruggieri, G. D.
83-001132
Russell, I. J.
83-000770
Ruszczynski, T.
83-001179
Sabocanec, R.
83-001148
Saethre, L. J.
83-001199
Saito, H.
83-001107
Salmi, J.
83-000989
Salwasser, H.
83-001222
83-001223
Sameshima, M.
83-000597
Sammelsel'g, V. A.
83-000613
Samples, K. C.
83-001273
Sanchez-Robles, J.
83-001025
Sand, O.
83-000759
Sangster, G. I.
83-001256
Sano, T.
83-001127
Sargent, J. R.
83-000661
Saroglia, M. G.
83-000697
Sastry, K. V.
83-001213
Sathyanesan, A. G.
83-001212
Sato, N.
83-001108
Sato, Y.
83-000635
Savitz, J.
83-000826
Schade, R.
83-000587
Schecter, A. J.
83-001204
Scherer, E.
83-000847
Schill, B.
83-001096
Schindler, D. W.
83-001179
Schlaghecke, R.
83-000771
Schmitz, O.
83-000588
Schoenhage, A. A. C.
83-000755
Schoenike, D. L.
83-001272
Schoots, A. F. M.
83-000642
Schrag, J. D.
83-000772
Schramm, H. L., Jr.
83-001038
Schreibman, M. P.
83-000702
Schubel, J. R.
83-001164
Schwarz, F. J.
83-000589
83-000598
Schwedler, T. E.
83-001211
83-001214
Scott, S. L.
83-000815
Seegers, L.
83-001076
Sekine, Y.
83-001087
Sezaki, K.
83-000814
Shand, J.
83-000633
Shea, T. B.
83-001215
Sheffy, T. B.
83-001181
Shelton, J. L., Jr.
83-000606
Shelton, W. L.
83-000806
Shenker, J. M.
83-000934
Sheridan, M. A.
83-000773
Shershnev, A. P.
83-000869
Shimamoto, K.
83-001223
Shimazaki, K.
83-000891
83-001261
Shimizu, A.
83-000915
Shimowada, T.
83-000836
Shirakawa, T.
83-001103
Short, E. C., Jr.
83-001189
83-001190
Shotts, E. B., Jr.
83-001100

Shrode, J. B.
83-000845
Shunyou, H.
83-001056
Shurben, D. G.
83-001182
Shute, J. R.
83-000870
Shute, P. W.
83-000870
Shuttleworth, T. J.
83-001217
Siddiqui, A. A.
83-001213
Simco, B. A.
83-000636
83-000829
Simenstad, C. A.
83-000990
Simpson, K. L.
83-000597
Sirotek, D.
83-000625
Sjoblom, V.
83-000872
83-000873
83-000874
83-000875
83-000888
83-000889
83-000930
83-001236
83-001240
Smith, G. R.
83-001077
Smith, M. H.
83-000815
83-000816
Smith, M. W.
83-000815
83-000816
Smith, R. L.
83-000774
Smitherman, R. O.
83-000684
83-001152
Sniezko, S. F.
83-001088
Snyder, D. E.
83-001058
Snyder, F. L.
83-000980
83-001023
Solangi, M. A.
83-001120
83-001121
Solazzi, M. F.
83-001251
Solemdal, P.
83-001069
Sorden, C. T.
83-000991
Sorensen, P. W.
83-001248
Sower, S. A.
83-000763
Spataru, P.
83-000590
Spears, R. W.
83-001183
Spigarelli, S. A.
83-001180
Srivastava, A. K.
83-001206
83-001216
Srivastava, G. C.
83-001116
Stagg, R. M.
83-001217
Staley, M. J.
83-001286
Stallybrass, H. G.
83-001146
Stanley, J. G.
83-000604
83-000797
Starliper, C.
83-001096
Statova, M. P.
83-000775
Stauffer, J. R., Jr.
83-000818
Stein, R. A.
83-000842
Stepanova, N. A.
83-001258
Stevens, J. D.
83-000916
Stewart, D. J.
83-001098
83-001109
Stewart, J. M.
83-000682
Stiles, R. A.
83-000914
Stoffle, R. W.
83-001274
Stoneburner, D. L.
83-000921
Stoss, J.
83-000566
83-000567
83-000607
Strange, R. J.
83-000781
Stratil, A.
83-000776
Strel'nikova, A. P.
83-000992
Stromberg, P. C.
83-001218
Stuart, N. C.
83-001089
Su, J.
83-000643
Sullivan, C. V.
83-000584

Sullivan, J. R.
83-001181
Sullivan, K. M.
83-000777
Sundnes, G.
83-001069
Suzuki, R.
83-000917
Svetovidov, A. N.
83-001079
Swallow, R. L.
83-000569
Sylvester, J. R.
83-001041
83-001231
Synder, D. E.
83-001078
Tabeta, O.
83-001043
83-001068
Tacon, A. G. J.
83-000591
Takahashi, A.
83-000720
Takahashi, H.
83-000690
Takahashi, K.
83-000778
Takama, K.
83-000778
Takatsuji, K.
83-000635
Takei, Y.
83-000724
Takeuchi, S.
83-001255
Takeuchi, T.
83-000592
Takita, T.
83-000912
Talbot, C.
83-000779
Talikina, M. G.
83-000775
Tanaka, S.
83-001269
Tanaka, Y.
83-000597
Taniguchi, M.
83-001110
83-001111
Tatum, W. M.
83-000580
Tave, D.
83-001152
Taylor, J. L.
83-000798
Taylor, J. N.
83-000918
Taylor, S. M.
83-000620
Terlou, M.
83-000693
Teyssedre, C.
83-000848
Thatcher, T. L.
83-001234
Thayer, G. W.
83-001259
Thebault, H.
83-000578
Theisen, B.
83-000644
Thieleke, J. R.
83-001156
83-001157
Thommes, M. M.
83-001180
Thompson, J.
83-000780
Thulin, J.
83-001153
Thurmon, G.
83-000645
Tisa, M. S.
83-000781
Toivonen, J.
83-000892
83-000924
83-000925
Tokranov, A. M.
83-001042
Tomasek, V.
83-000776
Tonn, W. M.
83-000981
Topp, G.
83-000782
Tota, B.
83-000762
Townsend, C. R.
83-000995
Trachtman, M. S.
83-000686
Tranquilli, J. A.
83-001169
Treasurer, J. W.
83-000919
Tregonning, R.
83-001024
Trial, J. G.
83-000604
Trifonova, O. V.
83-001278
Trimble, W. C.
83-000580
Tsuji, S.
83-001013
Tsukamoto, M.
83-001014
Tucker, C. S.
83-001214
Tucker, T.
83-000600
Turner, J. D.
83-000799

Turner, P. R.
83-001091
Tyler, A. V.
83-000906
Tzeng, W.
83-001043
Uematsu, K.
83-000783
Uemura, H.
83-000724
Uesugi, H.
83-000783
Ufodike, E. B. C.
83-000593
Umminger, B. L.
83-000757
Unger, P. A.
83-000977
Ushirogawa, K.
83-001014
Valenta, M.
83-000776
Valentijn, P.
83-000843
Van Den Hurk, R.
83-000667
Van Den Thillart, G.
83-000784
83-000787
Van Der Kraak, G.
83-000785
Van Der Meij, J. C. A.
83-000794
Van Der Veen, B.
83-000847
Van Eys, G. J. J. M.
83-000786
Van Waarde, A.
83-000787
Vascotto, G. L.
83-000882
Vasil'eva, Y. D.
83-000646
Verbeek, R.
83-000784
Vergara, L. A.
83-001090
Verigina, I. A.
83-000647
Verraes, W.
83-000630
Verwey, D.
83-000843
Vigh-Teichmann, I.
83-000788
83-000789
Vigh, B.
83-000788
83-000789
Villars, T. A.
83-000898
Viola, S.
83-000594
Vislie, T.
83-001192
Vivien-Roels, B.
83-000638
Vodicnik, M. J.
83-000798
Volk, E. C.
83-000990
Vondracek, B.
83-001277
Vrona, S. A.
83-000790
Vu, T. T.
83-000791
Wabuke-Bunoti, M. A. N.
83-000792
Wada, S.
83-000750
Wada, Y.
83-001102
Wahl, J. R.
83-001264
Wakefield, W. W.
83-000934
Waknitz, F. W.
83-000568
Waldrop, J. E.
83-000573
83-000575
Walker, R. L.
83-000741
Wallace, R. K.
83-000993
Walsh, A. H.
83-001139
Walters, C. J.
83-001286
Ward, J. A.
83-000907
83-000920
Ward, P. D.
83-001092
Warner, W. S.
83-001242
Watabe, S.
83-000814
Watanabe, T.
83-000592
83-000595
Watanabe, Y.
83-000648
Waters, T. F.
83-000893
Weatherley, A. H.
83-000793
Webb, P.
83-000573
Webb, P. W.
83-000849
Webber, C.
83-000684
Weber, D. T.
83-001228

Wechsler, E.
83-000692
Weems, R. E.
83-001080
Weinstein, M. P.
83-001259
Wendelaar Bonga, S. E.
83-000786
83-000794
Westerdahl, H. E.
83-001162
Westrheim, S. J.
83-001260
Whalen, R.
83-000921
White, A.
83-000795
White, E.
83-000609
White, P. N.
83-000994
Whitney, C. E.
83-001001
Whitney, K. G.
83-001001
Whitt, G. S.
83-000811
Widjaja, H. D.
83-000750
Wiegand, M. D.
83-000796
Wier, W.
83-001091
Wiersma, J.
83-000696
Wieser, W.
83-000699
Wilder, I. B.
83-000797
Wiles, M.
83-001133
Wilken, L. O.
83-000806
Wilkes, P. R. H.
83-000741
Williams, E. H., Jr.
83-001138
Williams, M. J.
83-001241
Williamson, J. H.
83-000596
Willis, D. E.
83-000703
Wilson, D. W.
83-001285
Winfield, I. J.
83-000995
Winkelhake, J. L.
83-000798
Winn, H. E.
83-001248
Wissmar, R. C.
83-000990
Wlasow, T.
83-001219
Wolburg, H.
83-000717
Woldemariam, K.
83-001109
Woo, N. Y. S.
83-000581
Wood, C. M.
83-000799
Woodhead, A. D.
83-001220
Woodhead, P. M. J.
83-001164
Woodward, B.
83-000617
Wooley, C. M.
83-001279
Wootton, R. J.
83-000936
Wren, C. D.
83-001171
Wright, G. M.
83-000800
Wu, R. S. S.
83-000581
Wydoski, R. S.
83-000909
Yakovlev, V. N.
83-000835
Yamada, S.
83-000597
Yamada, S. B.
83-001070
Yamamori, K.
83-000783
Yamamoto, S.
83-001261
Yamane, N.
83-001108
Yamashita, S.
83-000719
Yang, S.
83-000806
Yeomans, N. D.
83-000624
Yesaki, I.
83-000972
Yinrui, C.
83-001056
Yoklavich, M.
83-000996
Yoklavich, M. M.
83-001000
Yone, Y.
83-000586
Young, D. R.
83-001160
Youson, J. H.
83-000734
83-000735
Yuen, H.
83-000879

Zahary, R. G.
83-001235
Zama, K.
83-000778
Zaugg, W. S.
83-000568
Zbikowska, L.
83-000649
Zeitler, M. H.
83-000589
83-000598
Zenzerov, V. S.
83-000650
Zihler, F.
83-000651
Zimmerer, E. J.
83-001015
Zoran, M. J.
83-000920
Zuasti, A.
83-000652
Zucchetto, J.
83-001268

Africa: Lake Malawi
83-000910
Alabama
83-001284
83-001285
Alabama: Mobile Bay
83-001035
Alabama: West Point Reservoir
83-001239
Alaska
83-000865
Alaska: Bristol Bay
83-000879
Arctic
83-001293
Argentina
83-000615
Arizona
83-001046
83-001077
Arizona: Aravaipa Creek
83-000939
Arkansas: Illinois River
83-000938
Atlantic Ocean
83-000888
83-001027
83-001039
83-001230
Atlantic Ocean, North
83-000860
83-000867
83-000872
83-000873
83-000874
83-000875
83-000889
83-000923
83-000925
83-000930
83-000932
83-000989
83-001011
83-001167
83-001236
83-001240
83-001246
Atlantic Ocean, North: Georges Bank
83-000948
Atlantic Ocean, South
83-000940
Australia
83-000838
83-000985
83-001072
83-001143
Australia: Moreton Bay
83-001241
Australia: Tasmania
83-000969
Australia: Western Australia
83-001024
Bahama Islands
83-000949
Baltic Sea
83-000888
83-000923
83-000925
83-001246
Belize
83-000962
83-001066
Bering Sea
83-000927
83-001029
83-001032
83-001147
Brazil
83-001010
California
83-000871
83-000946
83-000951
83-000975
83-001160
83-001222
California: Mugu Lagoon
83-000945
California: North Fork Feather River
83-001277
California: San Francisco Bay
83-001135
Canada: British Columbia: Strait of Georgia
83-001286
Canada: Britsh Columbia
83-000852
Canada: Ontario
83-001250
Canada: Ontario: Experimental Lakes Area
83-001179
Canada: Ontario: Jack Lake
83-000855
Canada: Quebec
83-000880
Canada: Quebec: Eastmain River
83-001037
Caribbean Area
83-000949
Caribbean Sea
83-001016
Chesapeake Bay
83-000929
Chile
83-001090
China
83-000643
83-001055
China: Yunnan Province
83-001056
Colombia
83-001016
Colombia: Isles of Rosario
83-001031
Colorado: Colorado River
83-000909
83-001017

Colorado: Lake Cty.: Twin Lakes
83-001271
Columbia River
83-000976
Denmark
83-001167
Finland
83-000872
83-000873
83-000874
83-000875
83-000883
83-000889
83-000930
83-001236
83-001240
Finland: River Simojoki
83-000892
Florida
83-001003
83-001279
France
83-001005
French Guiana
83-001065
Georgia: Lake Seminole
83-001162
Georgia: West Point Reservoir
83-001239
Great Lakes
83-001175
83-001178
83-001273
Gulf of Alaska
83-001029
83-001147
Gulf of Elat
83-001026
Gulf of Mexico
83-000933
83-001018
83-001237
83-001279
Gulf of Mexico: Tamiahua Lagoon
83-001025
Haiti
83-001057
Hawaii
83-000864
83-000965
Honduras
83-001066
Hong Kong: Plover Cove Reservoir
83-000956
Illinois: Cedar Lake
83-000826
Illinois: DeKalb Cty.: Indian Creek
83-001233
Illinois: Lake Sangchris
83-001169
India
83-001059
Indian Ocean
83-001027

...CONTINUED...
Indian Ocean
83-001075
Iowa: Mississippi River
83-000922
Israel
83-000570
83-001050
Israel: Lake Kinneret
83-000877
Japan
83-000808
83-000810
Japan Sea
83-000866
Japan: Okhotsk Sea
83-000891
Kansas: Montgomery Cty.: Elk City Reservoir
83-001280
Korea
83-001021
83-001165
Korea: Nag-dong River
83-001033
Korea: Sudong River
83-001022
Lake Erie
83-000634
83-000942
Lake Erie: Old Woman Creek Estuary
83-000980
83-001023
Lake Huron
83-001036
Lake Michigan
83-000839
83-000954
83-001180
83-001270
83-001274
Lake Michigan: Green Bay
83-000904
Lake Ontario
83-001163
Lake Ontario: Bay of Quinte
83-000882
Lake Superior
83-000862
Louisiana
83-001238
Louisiana: Mississippi River
83-001028
Louisiana: Sabine Natl. Wildl. Refug
83-000890
Maine: Frenchman Bay
83-000828
Malawi
83-001262
Maryland
83-001080
Maryland: Patuxent River Estuary
83-000934
Mediterranean Sea
83-000859

...CONTINUED...
Mediterranean Sea
83-001026
Mexico: Gulf of California
83-000887
Mexico: Veracruz: Isle of Lobos
83-001019
Michigan
83-000857
Michigan: Burt Lake
83-000998
Midway Islands
83-000991
Minnesota: Mississippi River
83-001041
Minnesota: Valley Creek
83-000893
Mississippi
83-001158
83-001176
Mississippi River
83-001038
Mississippi River: Pool 7
83-001041
83-001231
Mississippi: Mississippi River
83-001038
Nevada: Pyramid Lake
83-001078
Nevada: Truchee River
83-001078
New Guinea: Lake Murray
83-001168
New Mexico
83-001077
New Mexico: Gila River
83-001091
New York: Oneida Lake
83-000978
New Zealand
83-001030
83-001049
Nigeria
83-000558
North America
83-001020
North Carolina: Great Smoky Mtn. Natl. Park
83-001276
Norway
83-000830
83-000860
Ohio: Old Woman Creek Estuary
83-000980
83-001023
Oregon
83-001251
Pacific Ocean
83-000864
83-000871
83-000931
83-000946
83-000951
83-000965

...CONTINUED...
Pacific Ocean
83-001024
83-001027
83-001030
83-001064
83-001068
83-001071
83-001129
83-001143
83-001160
83-001286
Paraguay
83-000918
Poland: Lake Sniardwy
83-000649
Poland: Zielony Lake
83-000955
Red Sea
83-000859
83-001061
83-001062
Scotland
83-001109
Seychelles Islands
83-001173
Somalia
83-000858
South Africa
83-000940
83-000943
83-001072
83-001287
South Africa: Algoa Bay: King's Beach
83-000884
South Africa: Bosluisbaai
83-001039
South Africa: Hartenbos Estuary
83-001282
South Africa: Kowie Estuary
83-001283
South Africa: Natal
83-000851
South Africa: Natal: Kosi Estuary
83-000850
South America
83-001048
South Carolina
83-000997
South Korea
83-001034
Surinam
83-001065
Sweden: Island of Gotland
83-001268
Taiwan
83-001043
Tennessee: Great Smoky Mtn. Natl. Park
83-001276
Texas
83-000933
Texas: Rio Grande Estuary
83-001040
United Kindom: Solway Firth
83-000867

United States, Northeastern
83-001166
United States, Southeastern
83-001053
USSR
83-000835
83-000869
83-001042
USSR: Chukotsk Peninsula
83-000619
USSR: Mongolia
83-000646
USSR: Pechora River
83-001012
USSR: River Ob
83-001278
USSR: Rybinsk Reservoir
83-000992
USSR: Tsimlyansk Reservoir
83-001281
USSR: Vilyuysk Reservoir
83-000967
Utah: Colorado River
83-001017
Venezuela
83-001076
83-001081
Vermont: Lake Champlain
83-000928
Virginia: Rockbridge Cty.: Guys Run
83-000885
Washington: Lake Washington
83-000959
Wisconsin: Fox River
83-001181
Wisconsin: Manitowoc Cty.: English Lake
83-001272
Wyoming: Colorado River
83-001017

Abramis brama
Foods/Feeding/Selectivity
83-000995
Acanthaluteres spilomelanurus
Foods/Feeding
83-000969
Acanthopagrus australis
Harvest
83-001241
Acheilognathus tabira
Light
83-000915
Reproduction
83-000915
Spawning
83-000915
Temperature
83-000915
Acipenser oxyrhynchus desotoi
Harvest
83-001279
Management/Research--Rivers and Streams
83-001279
Acipenser stellatus
Endocrinology
83-000657
83-000694
83-000729
Hormones
83-000694
83-000729
Reproduction
83-000657
Acipenser transmontanus
Culture/Propagation
83-000569
Adioryx
Taxonomy
83-001063
Adioryx ruber
Life History/General
83-000859
Meristic Studies
83-000859
Albula vulpes
Foods/Feeding
83-000949
Aldrichetta forsteŕi
Parasites/Diseases
83-001143
Tumors
83-001143
Alestes nurse
Condition Factors
83-001008
Allotriognathi
Fins
83-000640
Skeletal System
83-000640
Alopias superciliosus
Distribution/Geographical
83-001018
Alopias vulpinus
Musculature
83-000665
Alosa aestivalis
Marking/Tagging
83-001244
Alosa pseudoharengus
Economic Values
83-001273
Foods/Feeding
83-000954
Management/Research--Lakes
83-001273
Predator/Prey Relationships
83-001273
Amia calva
Auditory Senses
83-000844
Amphiprion bicinctus
Sex Reversal
83-000827
Anabas testudineus
Endocrinology
83-000671
Hormones
83-000671
Anchoa argentivittata
Taxonomy
83-001071
Anchoa mitchilli
Distribution/Geographical
83-000929
Distribution/Seasonal
83-000929
Ancistrus chagresi
Air Breathing
83-000695
Anguilla
European Eel Virus
83-001127
IPN
83-001127
Movements
83-000932
Parasites/Diseases
83-001127
Viral Diseases
83-001127
Anguilla anguilla
Bacterial Diseases
83-001098
83-001109
Calcium
83-000751
Endocrinology
83-000683
83-000712
83-000752
Gnathiidae
83-001146
Hormones
83-000683
83-000751

...CONTINUED...
Anguilla anguilla
Hypoxia
83-000787
Metabolic Rates
83-000787
Osmoregulation
83-000661
83-000752
Paragnathia
83-001146
Parasites/Diseases
83-001098
83-001109
83-001146
Parasitic Isopods
83-001146
Pineal Body
83-000788
Pseudomonas anguilliseptica
83-001098
83-001109
Salinity
83-000752
Sekiten-byo
83-001098
83-001109
Anguilla bicolor pacifica
Distribution/Geographical
83-001043
Anguilla japonica
Piromidic Acid
83-001087
Anguilla rostrata
Blood Chemistry
83-000686
Branding
83-001248
Hormones
83-000686
Marking/Tagging
83-001248
Movements
83-000921
83-000928
Orientation/Homing
83-000928
Anoplopoma fimbria
Bioenergetics
83-000777
Aplocheilus lineatus
Acoustico-Lateralis System
83-000782
Aplodinotus grunniens
Foods/Feeding
83-000942
Argentina silus
Maturation
83-000660
Aristichthys nobilis
Aquatic Plant Control
83-000944
Foods/Feeding/Selectivity
83-000944
Astatotilapia elegans
Dentition
83-000629
Early Development
83-000630
Mouth Parts
83-000630
Astyanax mexicanus
Activity Patterns
83-000822
83-000823
Circadian Rhythms
83-000822
83-000823
Light
83-000822
83-000823
Atherinidae
Competition
83-000985
Foods/Feeding
83-000985
Balitora pingi
New Species
83-001056
Balitora tchangi
New Species
83-001056
Barbopsis devechii
Distribution/Geographical
83-000858
Life History/General
83-000858
Morphology
83-000858
Barbus barbus
Age/Growth
83-001005
Age/Length Composition
83-001005
Barbus haasi
Taxonomy
83-001047
Beaufortia polylepis
New Species
83-001056
Bigener brownii
Parasites/Diseases
83-001143
Tumors
83-001143
Blennius incognitus
Dentition
83-000961
Foods/Feeding
83-000961
Blennius zvonimiri
Dentition
83-000961
Foods/Feeding
83-000961
Boleophthalmus chinensis
Age/Growth
83-001014

Brachydanio rerio
Mauthner Cell
83-000764
Brevoortia patronus
Culture/Propagation
83-000579
Laboratory Spawning
83-000579
Transportation
83-000579
Brevoortia tyrannus
Chlorine
83-001161
Nets/Netting
83-001259
Pollution Avoidance
83-001161
Power Plant Effluents
83-001161
Thermal Pollution
83-001161
Brienomyrus niger
Vision
83-000848
Buglossidium luteum
Life History/General
83-000867
Caffrogobius caffer
Foods/Feeding
83-000943
Campostoma pauciradii
New Species
83-001053
Carangidae
Life History/General
83-000851
Caranx georgianus
Parasites/Diseases
83-001143
Tumors
83-001143
Carassius aruatus
Vision
83-000717
Carassius auratus
Activity Patterns
83-000834
ATP
83-000757
Calcium
83-000710
Carbaryl
83-001215
Chromium
83-001159
Endocrinology
83-000698
Hypoxia
83-000784
Identification/Larvae
83-001060
Nervous System
83-000635

...CONTINUED...

Carassius auratus
Nervous System
83-000754
Orientation/Homing
83-000834
Phenols
83-001201
Potassium
83-001159
Regeneration
83-000717
Respiration
83-000784
Temperature
83-000757
83-000834
1-Naphthol
83-001215
Carassius auratus langsdorfi
Biochemical Composition
83-000814
Genetics
83-000814
Carassius carassius
Regeneration
83-000717
Vision
83-000717
Carcharhinus plumbeus
Abnormalities
83-001139
Parasites/Diseases
83-001139
Skeletal Lesions
83-001139
Carcharias taurus
Lipid Composition
83-000685
Catostomidae
Identification/Larvae
83-001078
Catostomus commersoni
Biomagnification
83-001175
Cadmium
83-001188
Early Development
83-000637
Embryology
83-000637
Heavy Metals
83-001188
Life History/General
83-000855
Sex Determination
83-001292
Spawning
83-000855
Catostomus discobolus
Fecundity
83-000909
Maturation
83-000909

Catostomus discobolus yarrowi
Taxonomy
83-001077
Catostomus macrocheilus
Endocrinology
83-000766
Hormones
83-000766
Catostomus tahoensis
Foods/Feeding
83-000975
Centropomus poeyi
Life History/General
83-000854
Movements
83-000854
Champsocephalus gunnari
Age//Growth
83-001004
Channa argus
Air Breathing
83-000713
Blood Chemistry
83-000713
83-000714
Cardio-Vascular System
83-000714
Respiration
83-000713
Channa punctatus
Anemia
83-000655
Blood Chemistry
83-000655
83-000738
Endosulfan
83-001213
Heavy Metals
83-001212
Insecticides
83-001213
Mercuric Chloride
83-001212
Mercury
83-001212
Pyridoxine
83-000655
Starvation
83-000738
Channa striatus
Bioenergetics
83-000756
Channichthys rhinoceratus
Cardio-Vascular System
83-000622
Cheilodactylus macropterus
Fish Stocks
83-000813
Variation Studies
83-000813
Chondrichthyes
Distribution/Geographical
83-001020

...CONTINUED...
Chondrichthyes
Heavy Metals
83-001156
Identification
83-001020
Life History/General
83-001020
Mercury
83-001156
Chromileptis altivelis
Coloration
83-000645
pH
83-000645
Chrysoblephus cristiceps
Abundance/Factors of
83-001287
Management/Research--Marine
83-001287
Chrysoblephus gibbiceps
Abundance/Factors of
83-001287
Management/Research--Marine
83-001287
Chrysoblephus laticeps
Abundance/Factors of
83-001287
Management/Research--Marine
83-001287
Chrysophrys major
Culture/Propagation
83-000586
Diets
83-000586
Feeding Experiments
83-000586
Cichla ocellaris
Ichthyophthiriasis
83-001119
Ichthyophthirius
83-001119
Parasites/Diseases
83-001119
Protozoan Diseases
83-001119
Cichlasoma citrinellum
Coloration
83-000616
Cichlidae
Digestive System
83-000651
Cirrhilabrus rubrisquamis
New Species
83-001075
Clupea harengus
Abundance
83-000874
83-000875
83-000889
Age/Growth
83-001011
Catch Per Unit Effort
83-001240

...CONTINUED...
Clupea harengus
Electrophoresis
83-000769
Maturation
83-001011
Movements
83-000930
Musculature
83-000769
Population Studies
83-000874
83-000875
83-000889
Clupea harengus harengus
Movements
83-000905
Clupea harengus membras
Electrofishing
83-001258
Electrophysiology
83-001258
Clupea harengus pallasi
Secondary Production
83-000901
Spawning
83-000901
Cobitidae
Taxonomy
83-001050
Colisa lalia
Caffeine
83-001116
Fungal Diseases
83-001116
Fungicides
83-001116
Parasites/Diseases
83-001116
Cololabis saira
Distributon/Geographical
83-001042
Nets/Netting
83-001261
Colossoma macropomum
Age/Growth
83-001010
Length-Weight Relationships
83-001010
Yield
83-001010
Conger conger
Biochemical Composition
83-000762
Congridae
Fish Lists/Keys
83-001068
Identification/Larvae
83-001068
Coregonus clupeaformis
Sex Determination
83-001292
Coregonus hoyi
Foods/Feeding
83-000954
Coregonus lavaretus pidschian
Age/Growth
83-001012
Foods/Feeding
83-000967
Maturation
83-001012
Coregonus muksun
Culture/Propagation
83-000605
Gamete Storage
83-000605
Corydoras robineae
New Species
83-001051
Cremnochorites
New Genus
83-001064
Ctenopharyngodon idella
Aquatic Plant Control
83-000557
83-000944
Blood Chemistry
83-000658
Enzymes
83-000658
Foods/Feeding/Selectivity
83-000944
Proteins
83-000718
Sex Reversal
83-000806
Culaea inconstans
Predator/Prey Relationships
83-000986
Skeletal System
83-000986
Cyclothone
Life History/General
83-000864
Cynoscion regalis
Distribution/Geographical
83-000929
Distribution/Seasonal
83-000929
Cyprinidae
Biochemical Composition
83-000776
Identification/Larvae
83-001058
Sperm
83-000662
Cyprinodon nevadensis nevadensis
Temperature
83-000691
Cyprinodon salinus
Social Behavior
83-000819
Cyprinodon variegatus
Creosote
83-001184
Oil Well Brines
83-001183

Cyprinus carpio
Amino Acids
83-000653
83-000676
83-000744
Biochemical Composition
83-000775
Blood
83-000618
Cardio-Vascular System
83-000675
Culture/Propagation
83-000587
83-000589
83-000593
83-000594
83-000598
Digestive System
83-000676
Eggs
83-000775
Feeding Experiments
83-000587
83-000589
83-000593
83-000594
83-000598
Feeds
83-000587
83-000589
83-000593
83-000594
83-000598
Gas Supersaturation
83-000697
GD-174
83-001193
Identification/Larvae
83-001060
Musculature
83-000696
Nutrition
83-000589
83-000598
Osmoregulation
83-000653
Piscicides
83-001193
Temperature
83-000587
83-000675
Cyrtocara eucinostomus
Brooding Behavior
83-000910
Spawning
83-000910
Dasyatis sabina
Enzymes
83-000767
Nervous System
83-000767
Dasyatis violacea
Distribution/Geographical
83-001018
Dicentrarchus labrax
Antigens
83-000674
Culture/Propagation
83-000578
Digestive System
83-000791
Immune Response
83-000674
Lipid Metabolism
83-000768
Salinity
83-000578
83-000768
Temperature
83-000578
Diplodus sargus
Recruitment
83-000884
Embiotocidae
Predator/Prey Relationships
83-000970
83-000971
Engraulis mordax
Contracaecum
83-001135
Nematodes
83-001135
Parasites/Diseases
83-001135
Enneapterygius clarkae
New Species
83-001064
Enneapterygius ventermaculus
New Species
83-001064
Epinephelus morio
Exploitation Rates
83-000878
Mortality Rates
83-000878
Population Studies
83-000878
Eptatretus stouti
Endocrinology
83-000763
Hormones
83-000748
Erpetoichthys calabaricus
Nervous System
83-000639
Esox lucius
Age/Growth
83-000857
Culture/Propagation
83-000577
Hatching Gland Cells
83-000642
Hybridization
83-000577
Maturation
83-000857
Meristic Studies
83-000649

...CONTINUED...
Esox lucius
Predator/Prey Relationships
83-000986
Temperature
83-000577
Esox masquinongy
Culture/Propagation
83-000577
Hybridization
83-000577
Predator/Prey Relationships
83-000842
Temperature
83-000577
Etheostoma aquali
Spawning
83-000914
Etheostoma asprigene
Spawning
83-000914
Etheostoma barbouri
Spawning
83-000914
Etheostoma blennioides
Habitat Selection
83-000840
Etheostoma chlorosomum
Spawning
83-000914
Etheostoma duryi
Spawning
83-000914
Etheostoma microlepidum
Spawning
83-000914
Etheostoma nigrum
Spawning
83-000900
Etheostoma tetragonum
Habitat Selection
83-000840
Etheostoma zonale
Habitat Selection
83-000840
Etroplus maculatus
Spawning
83-000907
83-000920
Eumicrotremus birulai
Distribution/Geographical
83-001029
Exos lucius
Production
83-000857
Flammeo
Taxonomy
83-001063
Fundulus
Eimeria funduli
83-001120
83-001121
Parasites/Diseases
83-001120
...CONTINUED...
Fundulus
Parasites/Diseases
83-001121
Protozoan Diseases
83-001120
83-001121
Spawning
83-000895
Fundulus grandis
Biochemical Composition
83-000580
Culture/Propagation
83-000580
pH
83-001205
Pond Culture
83-000580
Swimming Performance
83-001205
Fundulus heteroclitus
Copper
83-001187
Heavy Metals
83-001187
Osmoregulation
83-000730
Pineal Body
83-000753
Taste Reception
83-000628
Zinc
83-001187
Fundulus waccamensis
Life History/General
83-000870
Spawning
83-000870
Fundulus zebrinus
Taxonomy
83-001074
Gadidae
Bibliographies
83-001293
Life History/General
83-001293
Management/Research--Marine
83-001293
Gadopsis marmoratus
Digestive System
83-000624
Enzymes
83-000780
Lactate Dehydrogenase
83-000780
Gadus morhua
Age/Growth
83-001002
Catch Per Unit Effort
83-001236
Enzymes
83-000703
Respiratory System
83-000760

...CONTINUED...
Gadus morhua
Stress
83-000703
Xylene
83-001199
Galaxias fasciatus
Spawning
83-000913
Gambusia affinis
Age/Growth
83-000803
83-001015
Genetics
83-000803
Maturation
83-000803
Salinity
83-000672
83-001015
Variation Studies
83-000816
Gambusia luma
Foods/Feeding
83-000962
Trophic Relationships
83-000962
Gambusia sexradiata
Foods/Feeding
83-000962
Trophic Relationships
83-000962
Gasterosteus
Aggressive Behavior
83-000846
Territorial Behavior
83-000846
Gasterosteus aculeatus
Fecundity
83-000899
Foods/Feeding
83-000936
Reproductive System
83-000667
Spawning
83-000899
83-000911
Gasterosteus wheatlandi
Fecundity
83-000899
Spawning
83-000899
Genyonemus lineatus
DDT
83-001160
Insecticides
83-001160
Polychlorinated Biphenyls
83-001160
Genypterus chilensis
Parasites/Diseases
83-001090
Geotria australis
Biochemical Composition
83-000663
Gila bicolor mohavensis
Age/Growth
83-001001
Population Studies
83-001001
Gilchristella aestuarius
Foods/Feeding
83-000994
Ginglymostoma cirratum
Age/Growth
83-000876
Population Studies
83-000876
Glossogobius minutus
New Species
83-001059
Gnathonemus petersii
Vision
83-000848
Gobiesocidae
Distribution/Geographical
83-001066
Gobiesox barbatulus
Taxonomy
83-001066
Gobio gobio
Eimeria metchnikovi
83-001117
Parasites/Diseases
83-001117
Protozoan Diseases
83-001117
Gobiomorphus basalis
Life History/General
83-000868
Gobionellus boleosoma
Meristic Studies
83-000641
Gobionellus shufeldti
Meristic Studies
83-000641
Gobiosoma bosci
Movements
83-000934
Gobius giurinus
Acoustico-Lateralis System
83-000719
Chemoreception
83-000719
Haplochromis burtoni
Anorectics
83-001209
Harpagifer georgianus
Foods/Feeding
83-000940
Helcogramma fuscopinna
New Species
83-001064
Hemanthias peruanus
Hermaphroditism
83-000673
Hemerocoetinae
Taxonomy
83-001072

Hemimyzon macroptera
New Species
83-001056
Hemiramphus sajori
Biochemical Composition
83-000721
Heteropneustes fossilis
Fenthion
83-001216
Insecticides
83-001206
83-001216
Malathion
83-001206
Organophosphates
83-001216
Holocentrus
Taxonomy
83-001063
Homalopteridae
Taxonomy
83-001056
Hyperprosopon argenteum
Age/Growth
83-000856
Fecundity
83-000856
Life History/General
83-000856
Maturation
83-000856
Hypomesus transpacificus nipponensis
Gill Nets
83-001255
Nets/Netting
83-001255
Hypophthalmichthys molitrix
Cage Culture
83-000574
Culture/Propagation
83-000574
Gills
83-000625
Hypophthalmichthys nobilis
Blood Chemistry
83-000658
Enzymes
83-000658
Ictalurus furcatus
Oxygen
83-000684
Ictalurus melas
Gas Supersaturation
83-000697
Management/Research--Lakes
83-001272
Selenium
83-000706
Ictalurus natalis
Chlorinated Hydrocarbons
83-001176
Heavy Metals
83-001176
Ictalurus punctatus
Activity Patterns
83-000829
Age/Growth
83-000575
Ammonia
83-001207
Anesthetics
83-001211
Aroclor
83-001189
Benzo(a)pyrene
83-001189
83-001190
Chlorine
83-001207
83-001214
Culture/Propagation
83-000573
83-000575
83-000576
83-001214
Endocrinology
83-000636
Etomidate
83-001211
Foods/Feeding
83-000938
Insecticides
83-001189
Light
83-000829
Movements
83-000938
Naphthalene
83-001189
Nitrite
83-001214
Oxygen
83-000684
Polyculture
83-000576
Pond Culture
83-000576
83-001214
Isurus
Distribution/Geographical
83-001073
Taxonomy
83-001073
Isurus oxyrinchus
Reproduction
83-000916
Labeo umbratus
Spawning
83-000903
Lagodon rhoboides
Nets/Netting
83-001259
Lamna ditropis
Body Temperature
83-000774
Lampetra fluviatilis
Pineal Body
83-000788

Lampetra japonica
Reproductive System
83-000690
Lampetra lamottei
Enzymes
83-000735
Lates calcarifer
Marking/Tagging
83-001245
Leiostomus xanthurus
Nets/Netting
83-001259
Lepidosiren
Nervous System
83-000681
Respiratory System
83-000681
Lepomis gibbosus
Home Range
83-000826
Lepomis macrochirus
Abundance/Factors of
83-000897
Bioassay Techniques
83-001191
Biological Monitoring
83-001191
Escape Behavior
83-000842
Foods/Feeding
83-000993
Home Range
83-000826
Lactic Acid
83-000746
Mortality Factors
83-001044
Parasites/Diseases
83-001144
Posthodiplostomum minimum
83-001144
Predator/Prey Relationships
83-000842
Proteocephalus
83-001144
Trematodes
83-001144
Vision
83-000820
Lepomis microlophus
Chlorinated Hydrocarbons
83-001176
Electrophysiology
83-000731
Heavy Metals
83-001176
Limia rivasi
New Species
83-001057
Lithognathus mormyrus
Age/Growth
83-000884
Culture/Propagation
83-000571

...CONTINUED...
Lithognathus mormyrus
Feeding Experiments
83-000571
Fry Production
83-000571
Recruitment
83-000884
Lophiomus
Distribution/Geographical
83-001054
Taxonomy
83-001054
Lophius
Distribution/Geographical
83-001054
Taxonomy
83-001054
Loricariidae
Spawning
83-000918
Lota lota
Distribution/Vertical
83-000839
Lutjanidae
Bibliographies
83-000853
Macropodus opercularis
Cannibalism
83-000898
Light
83-000898
Spawning
83-000898
Macrozoarces americanus
Foods/Feeding
83-000974
Mallotus villosus
Gyrodactyloides andriaschewi
83-001150
Gyrodactyloides petroschewsk
83-001150
Laminiscus
83-001150
Parasites/Diseases
83-001150
Trematodes
83-001150
Meda fulgida
Foods/Feeding
83-000939
Melanogrammus aeglefinus
Endocrinology
83-000650
Menidia beryllina
Foods/Feeding
83-000993
Menidia menidia
Light
83-000912
Spawning
83-000912
Tides
83-000912

Merluccius bilinearis
Digestion Rates
83-000948
Foods/Feeding
83-000948
Merluccius productus
Biomass
83-000887
Population Studies
83-000887
Metaloricaria paucidens nijsseni
New Subspecies
83-001065
Metaloricaria paucidens paucidens
New Subspecies
83-001065
Meuschenia australis
Foods/Feeding
83-000969
Meuschenia freyceneti
Foods/Feeding
83-000969
Micropogonias undulatus
Nets/Netting
83-001259
Micropterus cocsae
Abundance
83-000997
Age/Growth
83-000997
Micropterus dolomieui
Biomagnification
83-001175
Swimming Performance
83-000849
Micropterus salmoides
Bioenergetics
83-000947
Chlorinated Hydrocarbons
83-001176
Culture/Propagation
83-000596
Electrophoresis
83-000811
Evolution
83-000815
Feeding Experiments
83-000596
Foods/Feeding
83-000947
83-000993
Genetic Strains
83-000596
Heavy Metals
83-001176
Home Range
83-000826
Hydrostatic Pressure
83-000688
Pressure Effects
83-000688
Mirogrex terraesanctae terraesanctae
Population Studies
83-000877
Misgurnus anguillicaudatus
Culture/Propagation
83-000917
Fecundity
83-000917
Induced Maturation
83-000917
Spawning
83-000917
Mola mola
Bacterial Diseases
83-001108
Citrobacter freundii
83-001108
Parasites/Diseases
83-001108
Monacanthidae
Foods/Feeding
83-000969
Morone americana
Age/Growth
83-000882
Competition
83-000980
Foods/Feeding
83-000980
Population Studies
83-000882
Sedimentation
83-001174
Morone chrysops
Biomagnification
83-001175
Competition
83-000980
Foods/Feeding
83-000980
Morone saxatilis
Anesthetics
83-001211
Blood Chemistry
83-000781
Chlorine
83-001194
Culture/Propagation
83-000585
83-000603
Early Development
83-000666
Embryology
83-000666
Etomidate
83-001211
Feeding Experiments
83-000585
Gamete Storage
83-000603
Nutrition
83-000585
Power Plant Effluents
83-001194
Sedimentation
83-001174

...CONTINUED...
Morone saxatilis
Temperature
83-000666
83-001194
Thermal Pollution
83-001194
Mugil
Parasites/Diseases
83-001081
Mugil cephalus
Aeromonas hydrophila
83-001099
Bacterial Diseases
83-001099
Calcium
83-000732
DDT
83-001177
Insecticides
83-001177
Magnesium
83-000732
Parasites/Diseases
83-001099
Taste Reception
83-000628
Temperature
83-001177
Mulloides flavolineatus
Foods/Feeding/Selectivity
83-000991
Muraenesox cinereus
Distribution/Geographical
83-001026
Myoxocephalus thompsoni
Distribution/Vertical
83-000839
Negaprion brevirostris
Abnormalities
83-001139
Parasites/Diseases
83-001139
Skeletal Lesions
83-001139
Neochanna burrowsius
Air Breathing
83-000745
Respiration
83-000745
Noemacheilinae
Taxonomy
83-001050
Nomeus gronovii
Commensalism
83-000833
Notemigonus crysoleucas
Anesthetics
83-001211
Etomidate
83-001211
Spawning
83-000897
Notothenia coriiceps
Foods/Feeding
83-000940
Notothenia macrocephala
Foods/Feeding
83-000940
Notropis atherinoides
Morphology
83-000621
Taxonomy
83-000621
Notropis boops
Meristic Studies
83-001052
Taxonomy
83-001052
Notropis cornutus
Temperature
83-000818
Temperature Selection
83-000818
Ocyurus chrysurus
Age/Growth
83-001003
Odax cyanoallix
New Species
83-001049
Odontaspis taurus
Abnormalities
83-001139
Parasites/Diseases
83-001139
Skeletal Lesions
83-001139
Onchorhynchus keta
Culture/Propagation
83-000592
Feeding Experiments
83-000592
Feeds
83-000592
Nutrition
83-000592
Onchorhynchus kisutch
Culture/Propagation
83-000592
Feeding Experiments
83-000592
Feeds
83-000592
Nutrition
83-000592
Oncorhynchus
Aquariums
83-000599
Culture/Propagation
83-000599
Fish Stocks
83-001070
Foods/Feeding
83-000982
IHN
83-001126
Parasites/Diseases
83-001082
83-001126

...CONTINUED...
Oncorhynchus
Viral Diseases
83-001126
Oncorhynchus gorbuscha
Life History/General
83-000869
Naphthalene
83-001208
Oil
83-001208
Oncorhynchus keta
Cardiac Arrest
83-000783
Cardio-Vascular System
83-000783
Culture/Propagation
83-000564
Early Development
83-000631
Endocrinology
83-000720
Fish Stocks
83-000808
Hormones
83-000720
Incubators
83-000564
Population Genetics
83-000808
Variation Studies
83-000810
Oncorhynchus kisutch
Anodonta oregonensis
83-001145
Culture/Propagation
83-000607
Endocrinology
83-000785
Foods/Feeding
83-000957
Gamete Storage
83-000607
Heavy Metals
83-001178
Hormones
83-000785
Insecticides
83-001163
Management/Research--Marine
83-001286
Mirex
83-001163
Organochlorines
83-001178
Osmoregulation
83-000737
Parasites/Diseases
83-001145
Parasitic Molluscs
83-001145
Reproduction
83-000785
Stocking/Introductions
83-001251
...CONTINUED...
Oncorhynchus kisutch
Supplemental Stocking
83-001251
Oncorhynchus nerka
Diphyllobothrium
83-001130
Foods/Feeding/Selectivity
83-000959
IHN
83-001125
Parasites/Diseases
83-001125
83-001130
Population Studies
83-000879
Predator/Prey Relationships
83-000959
Trematodes
83-001130
Viral Diseases
83-001125
Oncorhynchus tshawytscha
Culture/Propagation
83-000568
Diets
83-000568
Fish Stocks
83-000865
Heavy Metals
83-001178
Management/Research--Marine
83-001286
Organochlorines
83-001178
Osmoregulation
83-000568
Predator/Prey Relationships
83-000960
Salinity
83-000568
Scales
83-000865
Oncorhynchus tshwaytscha
Insecticides
83-001163
Mirex
83-001163
Ophioblennius atlanticus
Spawning
83-000908
Ophiodon elongatus
Cucullanus elongatus
83-001129
Nematodes
83-001129
Parasites/Diseases
83-001129
Oplegnathus fasciatus
Communication
83-000836
Vision
83-000836
Opsanus beta
ATP
83-000739

...CONTINUED...
Opsanus beta
Enzymes
83-000739
Osmoregulation
83-000749
Opsanus tau
Communication
83-000825
Sound Production
83-000825
Oreochromis mossambicus
Cage Culture
83-000574
Culture/Propagation
83-000574
Oreoleuciscus
Meristic Studies
83-000646
Skeletal System
83-000646
Taxonomy
83-000646
Oryzias latipes
Coloration
83-000711
Osmerus eperlanus
Age/Growth
83-000992
Osmerus mordax
Biological Tags
83-000880
Distribution/Geographical
83-001038
Fish Stocks
83-000880
Marking/Tagging
83-000880
Meristic Studies
83-000634
Parasites/Diseases
83-000880
Variation Studies
83-000634
Osopsaron natalensis
New Species
83-001072
Oxydoras kneri
Albinism
83-000615
Coloration
83-000615
Pagrus major
Age/Growth
83-001013
Paracheirodon innesi
Coloration
83-000633
Paralichthys
Abundance
83-000873
Population Studies
83-000872
83-000873
Paralichthys californicus
Foods/Feeding/Selectivity
83-000987
Paralichthys dentatus
Temperature
83-001164
Thermal Pollution
83-001164
Thermal Shock
83-001164
Paralichthys olivaceus
Life History/General
83-000866
Parophrys vetulus
Age/Growth
83-000996
Food Conversion Efficiency
83-000996
Foods/Feeding
83-000996
Spawning
83-000906
Temperature
83-000906
Upwelling
83-000906
Pelagocephalus marki
Distribution/Geographical
83-001030
Penicipelta vittiger
Foods/Feeding
83-000969
Peocilia latipinna
Age/Growth
83-001015
Perca flavescens
Biomagnification
83-001175
Foods/Feeding
83-000981
Home Range
83-000826
Nets/Netting
83-001257
pH
83-000765
Predator/Prey Relationships
83-000978
Trawls
83-001257
Perca fluviatilis
Acoustico-Lateralis System
83-000770
Competition
83-000984
Digestive System
83-000627
83-000708
Enzymes
83-000708
Foods/Feeding
83-000984
Nervous System
83-000770

...CONTINUED...
Perca fluviatilis
Spawning
83-000919
Percichthyidae
Taxonomy
83-001048
Perciliidae
Taxonomy
83-001048
Percina evides
Spawning
83-000914
Periophtalmus sobrinus
Aggressive Behavior
83-000821
Territorial Behavior
83-000821
Petromyzon marinus
Endocrinology
83-000734
83-000800
Enzymes
83-000735
Fecundity
83-000904
Hormones
83-000734
83-000800
Length-Weight Relationships
83-000904
Phreatichthys andruzzii
Distribution/Geographical
83-000858
Life History/General
83-000858
Morphology
83-000858
Pimephales promelas
Cadmium
83-001218
Embryology
83-000792
Endocrinology
83-000792
Escape Behavior
83-000842
Heavy Metals
83-001218
Herbicides
83-001185
Predator/Prey Relationships
83-000842
Propanil
83-001185
Platichthys flesus
Copper
83-001217
Endocrinology
83-000726
Heavy Metals
83-001217
Hormones
83-000759
...CONTINUED...
Platichthys flesus
Osmoregulation
83-001217
Reproduction
83-000726
Vitellogenin
83-000726
Platichthys stellatus
Parasites/Diseases
83-001131
Tumors
83-001131
Plecoglossus altivelis
Lipid Composition
83-000750
Parasites/Diseases
83-001142
Reproduction
83-000740
Tumors
83-001142
Pleurogrammus azonus
Life History/General
83-000891
Population Studies
83-000891
Pleuronectes platessa
Blood Chemistry
83-000795
Poecilia formosa
Aromatic Hydrocarbons
83-001220
Poecilia latipinna
Coloration
83-000801
Salinity
83-001015
Poecilia reticulata
Age/Growth
83-001015
Salinity
83-001015
Poecilia sphenops
Chloroform
83-001204
Tetrachloroethylene
83-001204
Trichloroethylene
83-001204
Poeciliopsis occidentalis
Abundance/Factors of
83-001046
Pogonias cromis
Distribution/Seasonal
83-000933
Pollachius virens
Electrophresis
83-000769
Movements
83-000926
Musculature
83-000769
Polysteganus undulosus
Abundance/Factors of
83-001287

...CONTINUED...
Polysteganus undulosus
Management/Research--Marine
83-001287
Pomadasys olivaceum
Recruitment
83-000884
Pomatoschistus minutus
Oil
83-001155
Pomoxis annularis
Abundance/Factors of
83-001280
Management/Research--Reservoirs
83-001280
Water Level Fluctuations
83-001280
Pomoxis nigromaculatus
Chlorinated Hydrocarbons
83-001176
Heavy Metals
83-001176
Management/Research--Lakes
83-001272
Prionace glauca
Distribution/Geographical
83-001018
Protopterus
Nervous System
83-000681
Respiratory System
83-000681
Psetta maxima
Bothriocephalus scorpii
83-001151
Parasites/Diseases
83-001151
Trematodes
83-001151
Pseudopleuronectes americanus
Foods/Feeding
83-000974
Pseudotolithus
Nematodes
83-001128
Parasites/Diseases
83-001128
Philometra translucida
83-001128
Pteropsaron hemmstrai
New Species
83-001072
Ptychocheilus lucius
Mortality Factors
83-001045
Pungitius pungitius
Fecundity
83-000899
Spawning
83-000899
Puntius sophore
Caffeine
83-001116
Fungal Diseases
83-001116
...CONTINUED...
Puntius sophore
Fungicides
83-001116
Parasites/Diseases
83-001116
Quisquilius flavicaudatus
New Species
83-001061
Raja clavata
Pineal Body
83-000789
Raja eglanteria
Embryology
83-000863
Life History/General
83-000863
Reinhardtius hippoglossoides
Life History/General
83-000860
Rhabdosargus globiceps
Age/Growth
83-000884
Recruitment
83-000884
Rhizoprionodon terraenovae
Age/Growth
83-001009
Rhodeus ocellatus ocellatus
Light
83-000894
Reproduction
83-000894
Spawning
83-000894
Temperature
83-000894
Rivulus deltaphilus
New Species
83-001076
Rutilus frisii kutum
Mortality Factors
83-000700
Temperature
83-000700
Rutilus rutilus
Eimeria branchiphila
83-001118
Foods/Feeding/Selectivity
83-000995
Parasites/Diseases
83-001118
Protozoan Diseases
83-001118
Variation Studies
83-000835
Salmo
Injuries
83-001134
Salmo gairdneri
Aeromonas salmonicida
83-001094
Age/Growth
83-000793

...CONTINUED...
Salmo gairdneri
Age/Growth
83-000809
83-001006
ATP
83-000716
Bacterial Diseases
83-001092
83-001094
83-001095
Biochemical Composition
83-000733
Biomagnification
83-001175
Blood Chemistry
83-000668
83-000679
83-000736
C-reactive Protein
83-000798
Catecholamines
83-000668
Chromosome Studies
83-000805
Culture/Propagation
83-000563
83-000566
83-000567
83-000584
83-000592
83-000602
83-000607
Digestive System
83-000617
83-000709
Egg Preservation
83-000602
Electrophoresis
83-000769
Endocrinology
83-000664
83-000693
83-000704
83-000771
Enteric Redmouth Disease
83-001095
Enterobacteria
83-001104
Enzymes
83-000659
Excretory System
83-000620
Feeding Experiments
83-000584
83-000592
Feeds
83-000584
83-000592
Fish Control/Removal
83-001276
Food Conservion Efficiency
83-000809
Foods/Feeding
83-000982

...CONTINUED...
Salmo gairdneri
Furunculosis
83-001094
Gamete Storage
83-000566
83-000567
83-000607
Genetics
83-000809
Herbicides
83-001186
Hormones
83-000668
83-000692
83-000704
83-000790
Hydrazine
83-001196
Hypothalamic-Hypophysial System
83-000693
Immunization
83-001092
Lactate Dehydrogenase
83-001249
Life History/General
83-000852
83-000862
Lipid Metabolism
83-000705
Management/Research--Rivers and Streams
83-000852
83-001276
Movements
83-000931
Musculature
83-000769
Nervous System
83-000709
Nutrition
83-000592
Osmoregulation
83-000664
83-000716
83-000727
83-000741
Parasites/Diseases
83-001092
83-001094
83-001095
83-001104
pH
83-000741
83-000742
83-001202
Phenols
83-001219
Pigmenters
83-000563
Pineal Body
83-000669
83-000788
Reproduction
83-000771

...CONTINUED...
Salmo gairdneri
Respiration
83-000678
83-000680
83-000758
Salinity
83-000620
Stocking/Introductions
83-001249
Stress
83-000679
83-000727
Swimming Performance
83-000849
Vibrio anguillarum
83-001092
Vibriosis
83-001092
Vision
83-000692
83-000817
Visions
83-000790
Wax Esters
83-000773
Yersinia ruckeri
83-001095
2,4-D
83-001186
Salmo salar
Ammonia
83-001182
Blood Chemistry
83-000679
Cadmium
83-001210
Carbaryl
83-000797
Cyanide
83-001182
DNA
83-000797
Endocrinology
83-000796
Fish Passage
83-001264
Foods/Feeding
83-000989
Generators
83-001264
Heavy Metals
83-001210
Marking/Tagging
83-001246
Movements
83-000883
83-000892
Osmoregulation
83-000779
Population Studies
83-000892
Reproduction
83-000796

...CONTINUED...
Salmo salar
RNA
83-000797
Stress
83-000679
Year Class Strength
83-000883
Salmo trutta
Aeromonas salmonicida
83-001094
Bacterial Diseases
83-001094
Blood
83-000618
Competition
83-000893
Cortisol
83-000761
Culture/Propagation
83-000562
Furunculosis
83-001094
Habitat Selection
83-000830
Hybridization
83-000562
Movements
83-000923
83-000924
83-000925
Osmoregulation
83-000779
83-001192
Parasites/Diseases
83-001094
pH
83-001192
Population Studies
83-000893
83-000923
Production
83-000893
Standing Crop
83-000893
Temperature
83-001180
Thermal Pollution
83-001180
Salmonidae
Aeromonas salmonicida
83-001097
Bacterial Diseases
83-001097
Economic Values
83-001273
Fish Counters
83-001263
Fungal Diseases
83-001115
IPN
83-001124
Management/Research--Lakes
83-001273

...CONTINUED...
Salmonidae
Parasites/Diseases
83-001097
83-001115
83-001124
Predator/Prey Relationships
83-001273
Saprolegnia
83-001115
Viral Diseases
83-001124
Salvelinus
Variation Studies
83-000619
Salvelinus alpinus
Lipid Content
83-000677
Metabolic Rates
83-000699
Oxygen
83-000699
Starvation
83-000677
Temperature
83-000699
Salvelinus fontinalis
Bird Predation
83-001123
Carbaryl
83-000797
Competition
83-000893
Culture/Propagation
83-000562
DNA
83-000797
Fish Control/Removal
83-001276
Foods/Feeding
83-000955
Hybridization
83-000562
83-001250
Management/Research--Rivers and Streams
83-001276
Parasites/Diseases
83-001123
Population Studies
83-000893
Production
83-000893
RNA
83-000797
Standing Crop
83-000893
Stocking/Introductions
83-001250
Salvelinus namaycush
Blood Chemistry
83-000679
Culture/Propagation
83-000565

...CONTINUED...
Salvelinus namaycush
Currents
83-000824
Fingerling Production
83-000565
Heavy Metals
83-001171
Hybridization
83-001250
Mercury
83-001171
Rheotropism
83-000824
Sex Determination
83-001292
Social Behavior
83-000824
Stocking/Introductions
83-001250
Stress
83-000679
Sardinops sagax
Biomass
83-000887
Population Studies
83-000887
Sardinops sagax caerulea
Biomass
83-000886
Population Studies
83-000886
Temperature
83-000886
Sarotherodon
Culture/Propagation
83-000590
Feeding Experiments
83-000590
Fertilization/Soil and Water
83-000590
Foods/Feeding
83-000590
Hybridization
83-000590
Polyculture
83-000590
Sarotherodon melanotheron
Culture/Propagation
83-000572
Fecundity
83-000572
Pond Culture
83-000572
Stunting
83-000572
Sarpa salpa
Age/Growth
83-000884
Recruitment
83-000884
Saurida undosquamis
Early Development
83-000623

...CONTINUED...
Saurida undosquamis
Embryology
83-000623
Scaphirhynchus albus
Life History/General
83-000861
Management/Research--General
83-000861
Status
83-000861
Scaphirhynchus platorhynchus
Habitat Selection
83-000922
Movements
83-000922
Scarus vetula
Spawning
83-000896
Sciaena gilberti
Lernanthropus pacificus
83-001149
Parasites/Diseases
83-001149
Parasitic Copepods
83-001149
Sciaenops ocellatus
Ammonia
83-001197
Distribution/Seasonal
83-000933
Habitat Selection
83-000831
Nitrite
83-001197
Scleropages jardini
Age/Growth
83-001007
Scleropages leichardti
Age/Growth
83-001007
Scomberomorus commersoni
Distribution/Geographical
83-001024
Scophthalmus maximus
Culture/Propagation
83-000582
Feeding Experiments
83-000582
Feeds
83-000582
Scophthalmus rhombus
Bothriocephalus scorpii
83-001151
Parasites/Diseases
83-001151
Trematodes
83-001151
Scyliorhinus
Starvation
83-000654
Scyliorhinus canicula
Electroreception
83-000843
...CONTINUED...
Scyliorhinus canicula
Embryology
83-000743
Orientation/Homing
83-000843
Reproduction
83-000743
Scyliorhinus stellaris
Biochemical Composition
83-000762
Sebastes
Age/Growth
83-000999
Temperature
83-000999
Sebastes entomelas
Foods/Feeding
83-000935
Sebastes jordani
Predator/Prey Relationships
83-000946
Sebastes melanops
Age/Growth
83-001000
Temperature
83-001000
Sebastes pinniger
Aquariums
83-000600
Culture/Propagation
83-000600
Semicossyphus pulcher
Predator/Prey Relationships
83-000950
Trophic Relationships
83-000950
Seriola quinqueradiata
Bacterial Diseases
83-001103
83-001110
83-001111
Immunization
83-001110
83-001111
Parasites/Diseases
83-001103
83-001110
83-001111
Streptococcus
83-001103
83-001110
83-001111
Silurus glanis
Parasites/Diseases
83-001148
Tumors
83-001148
Sinohomaloptera longibarbatus
New Species
83-001056
Solea solea
Olfaction
83-000614

...CONTINUED...
Solea solea
Taste Reception
83-000614
Sparisoma aurofrenatum
Parasites/Diseases
83-001138
Tumors
83-001138
Sparus aurata
Chloromyxum
83-001122
Excretory System
83-000652
Parasites/Diseases
83-001122
Protozoan Diseases
83-001122
Sphyraena barracuda
Life History/General
83-000850
Sphyrna tiburo
Cestodes
83-001132
Parasites/Diseases
83-001132
Phoreiobothrium tiburonis
83-001132
Spinachia spinachia
Olfaction
83-000644
Sprattus sprattus
Abundance
83-000874
83-000888
Catch Per Unit Effort
83-001240
Population Studies
83-000874
83-000888
Sprattus sprattus balticus
Age/Growth
83-000613
Otoliths
83-000613
Squalus acanthias
Osmoregulation
83-000687
Parasites/Diseases
83-001141
Squalotrema llewellyni
83-001141
Trematodes
83-001141
Squamicreedia obtusa
Taxonomy
83-001072
Stizostedion vitreum vitreum
Age/Growth
83-000998
Early Development
83-000637
Embryology
83-000637

...CONTINUED...
Stizostedion vitreum vitreum
Foods/Feeding
83-000976
Synanceia verrrucosa
Foods/Feeding
83-000963
Synodontis schall
Condition Factors
83-001008
Tetraodontiformes
Olfaction
83-000643
Thunnus albacares
Heavy Metals
83-001157
Mercury
83-001157
Thunnus maccoyii
Parasites/Diseases
83-001143
Tumors
83-001143
Thunnus obesus
Heavy Metals
83-001157
Mercury
83-001157
Thunnus thynnus
Thermal Regulation
83-000670
Thunnus thynnus orientalis
Biochemical Composition
83-000747
Tilapia
Culture/Propagation
83-000590
Feeding Experiments
83-000590
Fertilization/Soil and Water
83-000590
Foods/Feeding
83-000590
Hybridization
83-000590
Polyculture
83-000590
Tilapia aurea
Culture/Propagation
83-000583
Feeding Experiments
83-000583
Feeds
83-000583
Genetic Defects
83-001152
Parasites/Diseases
83-001152
Saddleback Disease
83-001152
Tilapia mossambica
Amino Acids
83-000656
Culture/Propagation
83-001262

...CONTINUED...
Tilapia mossambica
Endocrinology
83-000722
83-000786
Fertilization/Soil and Water
83-001262
Osmoregulation
83-000656
Reproduction
83-000722
Skeletal System
83-000794
Temperature
83-000722
Vitamins
83-000794
Tilapia nilotica
Blood Chemistry
83-000597
Culture/Propagation
83-000597
Feeding Experiments
83-000597
Feeds
83-000597
Tilapia rendalli
Genetics
83-000804
Tilapia zillii
Condition Factors
83-001008
Tinca tinca
Spawning
83-000902
Temperature
83-000902
Tomiyamichthys randalli
New Species
83-001062
Trachurus capensis
Age/Growth
83-000884
Recruitment
83-000884
Trachurus declivis
Variation Studies
83-000812
Trichogaster pectoralis
Biochemical Composition
83-000701
Typhlobarbus
New Genus
83-001055
Typhlobarbus nudiventris
New Species
83-001055
Uegitglanis zammaranoi
Distribution/Geographical
83-000858
Life History/General
83-000858
Morphology
83-000858
Urophycis chuss
Commensalism
83-000828
Taxonomy
83-001079
Urophycis tenuis
Taxonomy
83-001079
Xenodermichthys copei
Digestive System
83-000647
Histology
83-000647
Xenomelaniris venezuelae
Foods/Feeding
83-000977
Xiphias gladius
Distribution/Geographical
83-001027
Distribution/Seasonal
83-001027
Xiphophorus maculatus
Coloration
83-000807
Hormones
83-000702

U.S. GOVERNMENT PRINTING OFFICE: 1983-676-081/7

SUBSCRIPTION INFORMATION

For current subscription price contact:

Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

U.S. Federal Agencies in wildlife-related fields and individuals or agencies who exchange domestic or foreign publications may receive free subscription to *Sport Fishery Abstracts* by writing to:

Editorial Office—*Sport Fishery Abstracts*
U.S. Fish and Wildlife Service
270 Aylesworth Hall, CSU
Fort Collins, CO 80523

CHANGE OF ADDRESS

If SFA is the first entry on the first line of your address label, send your new address and your former address *exactly* as it appears on your mailing label to:

The Government Printing Office
Superintendent of Documents
Washington, DC 20402

If a 5-digit number appears as the first line of the label, send your new address and your former address *exactly* as it appears on your mailing label to:

Editorial Office—*Sport Fishery Abstracts*
U.S. Fish and Wildlife Service
270 Aylesworth Hall, CSU
Fort Collins, CO 80523

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
EDITORIAL OFFICE
AYLESWORTH HALL CSU
FORT COLLINS, COLORADO 80523

PRESORTED
SPECIAL FOURTH-CLASS RATE
POSTAGE & FEES PAID
USDI
PERMIT No. G-77